Serial No. 587

RESTRICTED

PRELIMINARY INSTRUCTION BOOK

FOR

NAVY MODELS
TCM-2 and TCU-2
RADIO TRANSMITTING EQUIPMENTS

Manufactured for

U.S. NAVY DEPARTMENT

BUREAU OF SHIPS

Under Contract NXss-15910 Dated 1 June, 1943

By

GENERAL ELECTRIC COMPANY

SCHENECTADY, N. Y.

U.S.A.

RESTRICTED

This instruction book is furnished for the information of commissioned, warrant, enlisted, and civilian personnel of the Navy whose duties involve design, instruction, operation, and installation of radio and sound equipment. The word "RESTRICTED" as applied to this instruction book signifies that this instruction book is to be read only by the above personnel and that the contents of it should not be made known to persons not connected with the Navy.

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Sept. 1943 (2230)

To be Superseded by Final Instructions

"PERSONNEL ENGAGED IN THE INSTALLATION, OPERATION AND MAINTENANCE OF THIS EQUIPMENT OR SIMILAR EQUIPMENT ARE URGED TO BECOME FAMILIAR WITH THE FOLLOWING RULES BOTH *IN THEORY AND IN THE PRACTICAL APPLICATION THEREOF.* IT IS THE DUTY OF EVERY RADIOMAN TO BE PREPARED TO GIVE ADEQUATE FIRST AID AND THEREBY PREVENT AVOIDABLE LOSS OF LIFE. YOUR OWN LIFE MAY DEPEND ON THIS."

MEDICAL DEPARTMENT
UNITED STATES NAVY

ELECTRIC SHOCK
FIRST AID TREATMENT

DIVISION OF PREVENTIVE MEDICINE
1942

SAFETY FIRST

Regard electrical apparatus generally, and especially all current-carrying parts, as dangerous, irrespective of voltage. Exercise great care in handling, and avoid broad contacts such as are made by standing on a metal deck or in water.

Dangerous contact may result through lessened resistance when the skin and clothing are wet with perspiration. Contact with damp metal surfaces—decks, bulkheads, guns, machinery—may allow the current to ground through the moist skin and body.

Electric shock is due to current passing through the body—current actually passing—irrespective of the voltage. A pressure as low as 110 volts has caused death. Current passing through the body in the region of the heart is especially dangerous. In using electric breast drills avoid the possibility of a ground.

Usually electric shock does not kill instantly. Life can often be saved even though breathing has stopped.

I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY

Use a dry nonconductor (rubber gloves, clothing, rope, board) to move either the victim or the wire. Beware of using metal or moist material.

Shut off the current.

If necessary to cut a live wire, use an ax or hatchet with a dry wooden handle; turn your face away from the electrical flash.

II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING

Begin resuscitation at once on the spot. Do not stop to loosen clothing; every moment counts.

RESUSCITATION BY THE PRONE PRESSURE METHOD OF ARTIFICIAL RESPIRATION

GAS ASPHYXIATION — ELECTRIC SHOCK — DROWNING

Waste no time. When the patient is removed from the water, gas, smoke, or electric contact, get to work at once with your own hands. Send for the medical officer or nearest physician.

No reliance should be placed upon any special mechanical apparatus, as it is frequently out of order and often is not available when most needed. The patient's mouth should be cleared of any obstruction such as chewing gum or tobacco, false teeth, or mucus, so that there is no interference with the entrance and escape of air.

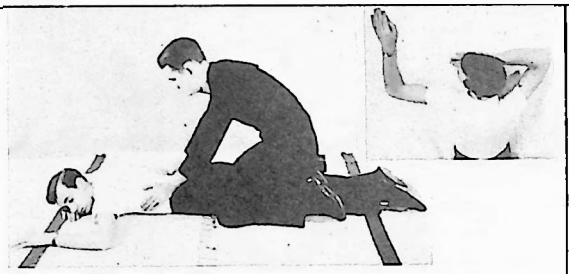

Figure 1.

POSITION

1. Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow and with the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing. (See Inset Fig. 1.)

2. Kneel straddling the patient's thighs with your knees placed at such a distance from the hip bones as will allow you to assume the position shown in Figure 1.

Place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib, with the thumb and fingers in a natural position, and the tips of the fingers just out of sight. (See Fig. 1.)

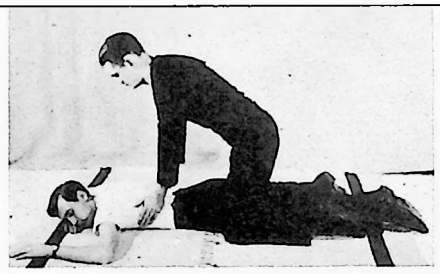

Figure 2.

FIRST MOVEMENT

3. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. (See Fig. 2.) Do not bend your elbows. This operation should take about two seconds.

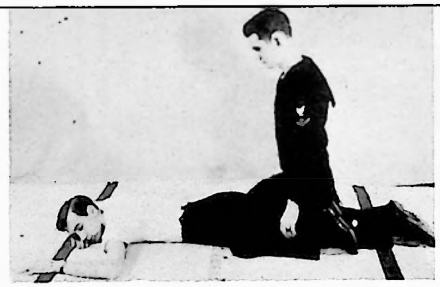

Figure 3.

SECOND MOVEMENT

4. Now immediately swing backward, so as to remove the pressure completely. (See Fig. 3.)

5. After two seconds, swing forward again. Thus repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6. Continue artificial respiration without interruption until natural breathing is restored. Do not get discouraged at the slow results that sometimes happen when resuscitating the apparently drowned. Efforts often have to be continued a long time before signs of life are apparent. Do not discontinue the efforts until certain that all chance is lost. Sometimes, even after several hours' work, recovery takes place.

7. As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. TO KEEP THE PATIENT WARM DURING ARTIFICIAL RESPIRATION IS MOST IMPORTANT AND IT MAY BE NECESSARY TO COVER HIM WITH BLANKETS AND WORK THROUGH THEM, AS WELL AS TO APPLY HOT-WATER BOTTLES, HOT BRICKS, ETC. Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. Continue to keep the patient warm and at rest.

9. Resuscitation should be carried on at the nearest possible point where the patient received his injuries. As a general rule, he should not be moved from this point until he is breathing normally of his own volition and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration, stops breathing again. The patient must be watched, and if natural breathing stops, artificial respiration should be resumed at once.

11. In carrying out resuscitation it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. The relief operator should kneel behind the one giving the artificial respiration and at the end of the movement, the operator crawls forward while the relief takes his place. By this procedure no confusion results at the time of change of operator, and a regular rhythm is kept up.

PRACTICE IN THE PERFORMANCE OF ARTIFICIAL RESPIRATION ON A VOLUNTEER SUBJECT SHOULD BE OBTAINED BY EVERYONE

SAFETY TO HUMAN LIFE

(a) OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR-GENERATORS OR OTHER POWER EQUIPMENT AND OPEN MAIN SWITCH IN POWER SUPPLY CIRCUIT. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

(b) Since the use of high voltages which are dangerous to human life is necessary to the successful operation of the radio transmitting equipment covered by these instructions, certain reasonable precautionary measures must be carefully observed by the operating personnel during the adjustment and operation of the equipment.

(c) The major portions of the equipment are within shielding enclosures, provided where necessary with access doors which are generally fitted with safety interlock switches which act to shut off dangerous voltages within the enclosures when the access doors are open.

(d) While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed.

(e) It should be borne in mind that interlocks are provided only on normal access doors on certain major units and therefore side, back or top screens or commutator covers, if removed, will not cause interlocks to function and will thereby allow access to circuits carrying voltages dangerous to human life.

(f) *KEEP AWAY FROM LIVE CIRCUITS.* Under no circumstances should any person be permitted to reach within or in any manner gain access to the enclosure with interlocked gates or doors closed or with power supply line switches to the equipment closed; or to approach or handle any portion of the equipment which is supplied with power, or to connect any apparatus external to the enclosure to circuits within the equipment; or to apply voltages to the equipment for testing purposes while any non-interlocked portion of the shielding or enclosure is removed or open. Wherever feasible in testing circuits, check for continuity and resistance rather than directly checking voltage at various points.

(g) *DON'T SERVICE OR ADJUST ALONE.* Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

(h) *DON'T TAMPER WITH INTERLOCKS.* Under no circumstances should any access gate, door or safety interlock switch be removed, short circuited, or tampered with in any way, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

THE ATTENTION OF ENGINEER OFFICERS, RADIO OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO BUREAU OF SHIPS CIRCULAR LETTER NO. 5a OF 3 OCTOBER 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF "RADIO—SAFETY PRECAUTIONS TO BE OBSERVED."

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GEH-985F—Type CR2820-1099 Relay

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NAVY MODELS TCM-2 AND TCU-2

RADIO TRANSMITTING EQUIPMENTS

I. GUARANTEE

The equipment including all parts and spare parts, except vacuum tubes, batteries, rubber and material normally consumed in operation is guaranteed for a period of one year from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced f.o.b. any part within the continental limits of the United States designated by the Government without delay and at no expense to the Government provided that such guarantee will not obligate the contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts as defined above, is of the contractor's design or is of a design selected by the contractor, it is also guaranteed, subject to the foregoing conditions against defects in design with the understanding that if ten per cent (10%) or more of any such said item, but not less than two of any such item of the total quantity comprising such item furnished under the contract, are found to be defective as to design such item will be conclusively presumed to be of defective design and subject to one hundred per cent (100%) correction or replacement by a suitable redesigned item.

All such defective items will be subject to ultimate return to the contractor. In view of the fact that normal activities of the Naval service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service therefore, may necessitate expeditious repair of such items in order to prevent extended interruption of communications. In such cases the return of the defective items for examination by the contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of the contractual guarantee.

The above one-year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the contractor will be guaranteed anew under this provision.

II. REPORT OF FAILURE

Report of failure of any part of these equipments during its service life shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and shall give the date of installation of the equipment. (See latest revision of Bureau of Ships Circular Letter No. 40.)

III. GENERAL

The Navy Models TCM-2 and TCU-2 Radio Transmitting Equipments are designed primarily for radio stations ashore or afloat wherever a compact medium-powered radio transmitter is required. The equipments are constructed to provide efficient, reliable, and rapid communication.

IV. COMPONENT UNITS

A. Navy Model TCM-2 Radio Telegraph and Telephone Transmitting Equipment.

(1) H-f Radio Transmitter, Navy Type CG-52206 G.E. Co. Designation: Model No. 4W313A

Rating: 2000–18,100 kc; 115 volts, single-phase, 50 to 62 cycles; CW (A1), 125 watts; MCW (A2), 30 watts; Phone (A3), 30 watts

Vacuum Tubes:
4—Navy Type -837
2—Navy Type -803

Dimensions: Drawing No. P-7763469

(2) Rectifier, Navy Type CG-20122
G.E. Co. Designation: Model No. 4W315A
Rating: Input: 115 volts, single-phase, 50 to 62 cycles;
Output: 1300 volts, 0.35 ampere d-c
500 volts, 0.425 ampere d-c
55 volts, 0.45 ampere d-c

Vacuum Tubes:
4—Navy Type -836

Dimensions: Drawing No. P-7763466

(3) Control Unit, Navy Type CG-23241
G.E. Co. Designation: Model No. 4MY27B1
Dimensions: Drawing No. M-7465454

(4) One Hand Microphone, Navy Type CMX-51004C
G.E. Co. Drawing No. M-48J580

B. Navy Model TCU-2 Radio Telegraph Transmitting Equipment.

(1) I-f Radio Transmitter, Navy Type CG-52205
G.E. Co. Designation: Model No. 4G10D1
Rating: 300–2000 kc; 115 volts, single-phase, 50 to 62 cycles; CW (A1), 125 watts; MCW (A2), 30 watts

Vacuum Tubes:
3—Navy Type -837
2—Navy Type -803

Dimensions: Drawing No. P-7763470

(2) Rectifier, Navy Type CG-20122
G.E. Co. Designation: Model No. 4W315A
Rating: Input: 115 volts, single-phase, 50 to 62 cycles
Output: 1300 volts, 0.35 ampere d-c
500 volts, 0.425 ampere d-c
55 volts, 0.45 ampere d-c

Vacuum Tubes:
4—Navy Type -836

Dimensions: Drawing No. P-7763466

(3) Control Unit, Navy Type CG-23241
G.E. Co. Designation: Model No. 4MY27B1
Dimensions: Drawing No. M-7465454

V. WEIGHTS

These are approximate weights.

	TCM-2	TCU-2
H-f Radio Transmitter Navy Type CG-52206	169 lb	*
I-f Radio Transmitter Navy Type CG-52205	*	146 lb
Rectifier Navy Type CG-20122	229 lb	229 lb
Control Unit Navy Type CG-23241	17 lb	17 lb
Spare Parts (including spare parts box)	95 lb	93 lb

* Unit not included in equipment.

VI. RATING

	OUTPUT	EMISSION	FREQ. RANGE
Navy Model TCM-2	125 Watts	CW (A1)	2000–18,100 kc
Radio Equipment	30 Watts	MCW (A2)	2000–18,100 kc
	30 Watts	Phone (A3)	
Navy Model TCU-2	125 Watts	CW (A1)	300–2000 kc
Radio Equipment	30 Watts	MCW (A2)	300–2000 kc

H-f Radio Transmitter Navy Type CG-52206 and I-f Radio Transmitter Navy Type CG-52205 are designed for telegraphic operation at any speed up to 40 words per minute.

The transmitting apparatus described in this Instruction Book is designed to deliver pure continuous-wave radio-frequency power output to the antenna system, exclusive of loading system loss.

Under conditions of modulated CW or Phone, the power output is not less than one-quarter of the outputs listed at approximately 90 per cent modulation.

VII. ANTENNA CHARACTERISTICS

Navy Models TCM-2 and TCU-2 Radio Transmitting Equipments are designed to supply pure r-f energy into the following antenna:

Electrostatic Capacity	Inductance	Resistance	Fundamental Frequency
380 uufd	38 uh	5 to 50 ohms	1310 kc

In addition, the antenna resonating system is flexible enough to tune to antennas whose inductance and capacitance values vary from the above values.

I-f Radio Transmitter Navy Type CG-52205 will tune to an antenna which has an inductance as high as 180 uh.

Over the h-f band, it is necessary to feed antennas above and below their fundamental frequencies. Therefore, the circuit constants are so selected as to permit both current and voltage feed. A single-wire antenna, either vertical or a combination of vertical and horizontal with a total length of approximately 100 feet, will be found to be satisfactory over the h-f range.

VIII. METHODS OF SIGNALLING

H-f Radio Transmitter Navy Type CG-52206 is designed for 1000-cycle tone modulation, and also for voice modulation of the transmitter output over the audio-frequency range of 200 to 3000 cycles. The design is such that the audio characteristic from input transformer to antenna is flat within plus or minus two decibels. When using a carrier output of 25 per cent of the required CW output, and the carbon microphone supplied, the carrier can be modulated approximately 90 per cent over the audio-frequency range of 200 to 3000 cycles.

Radio Transmitters Navy Types CG-52205 and CG-52206 are designed for 1000-cycle tone modulation. When using a carrier output of 25 per cent of the required CW output, the carrier can be modulated approximately 90 per cent.

IX. VACUUM TUBES

H-f Radio Transmitter Navy Type CG-52206:

- One Type -837 as master oscillator
- One Type -837 as first intermediate power amplifier or frequency doubler
- One Type -837 as second intermediate power amplifier or frequency doubler
- One Type -837 as modulator
- Two Type -803 as power amplifier

I-f Radio Transmitter Navy Type CG-52205:

- One Type -837 as master oscillator
- One Type -837 as intermediate power amplifier, frequency doubler, or tripler
- One Type -837 as audio oscillator
- Two Type -803 as power amplifier

Rectifier Navy Type CG-20122:

- Two Type -836 as the main plate rectifier
- Two Type -836 as the auxiliary plate rectifier

IT SHOULD BE OBSERVED THAT A VERY DECIDED DECREASE IN THE USEFUL LIFE OF A VACUUM-TUBE FILAMENT IS OCCASIONED BY OVERVOLTAGE AND, IN THE CASE OF MOST MODERN TYPES OF TUBES, BY UNDERVOLTAGE ALSO. OPERATING PERSONNEL ARE CAUTIONED TO BURN FILAMENTS AT EXACTLY RATED VOLTAGE UNLESS SPECIFICALLY INSTRUCTED OTHERWISE.

The Type -837 is a pentode transmitting tube of the heater cathode type designed for use as an r-f amplifier or oscillator. The heater of this tube requires 0.7 ampere at 12.6 volts. The tube is designed to operate at a maximum d-c plate potential of 500 volts and a maximum d-c plate current of 80 milliamperes. Neutralization is generally unnecessary in adequate shielded circuits. The suppressor and the internal shields are connected to individual base pins. The Type -837 tube may be operated at its maximum ratings at frequencies as high as 20 megacycles.

The Type -803 tube is rated at 130 to 210 watts gross output when used as a Class C r-f amplifier, telegraphic operation. The thoriated tungsten filament of this tube requires five amperes at 10 volts. In this equipment, a d-c plate potential of approximately 1350 volts is used. Like the Type -837, this tube includes a screen grid and a suppressor grid.

The Type -836 rectifier tube has an average plate current rating of 0.25 ampere and a maximum peak inverse rating of 5000 volts. Its coated heater requires five amperes at 2.5 volts.

X. POWER SUPPLY

The Navy Models TCM-2 and TCU-2 Radio Transmitting Equipments are designed to operate from a 115-volt, 60-cycle power supply within the limits of minus 15 per cent and plus 10 per cent on voltage, and within the frequency range of 50 to 62 cycles, inclusive.

The power required for full-power operation of these transmitting equipments from the 115-volt, 60-cycle supply line is approximately 1200 watts.

XI. MECHANICAL CONSTRUCTION

The H-f Radio Transmitter Navy Type CG-52206, I-f Radio Transmitter Navy Type CG-52205, and Rectifier Navy Type CG-20122 are enclosed in aluminum alloy cases which are identical except for depth.

Each unit is equipped with a louvered rear shield which clamps the chassis within its case by means of large screws. Entrance of insects and rodents is prevented by wire mesh screens placed over the louver openings. Hinged access doors are provided on the rear shields and are interlocked so as to automatically remove high voltages from the unit when the doors are opened. All vacuum tubes are made accessible for replacement upon opening these access doors.

The chasses of the three units are similar in construction. They consist mainly of a sturdy duralumin angle frame to which a vertical front panel is permanently secured. The various circuit components are mounted on several shelves within the frame. In order to keep the center of gravity of the chassis as low as possible, the heaviest items are located on the lower shelves. All controls and instruments are mounted in a symmetrical arrangement on the front panel. Four rigid handles which project beyond all controls are affixed to the front panel and are used to remove the chassis from its case. Panels are equipped with panel lamps of the hinged type which can be adjusted to illuminate all instruments and controls.

XII. INSTALLATION

Before placing the Navy Models TCM-2 or TCU-2 Radio Transmitting Equipment in operation for the first time, a careful examination must be made to make certain that all packing material (such as white tape used for lashing items in place during shipment) has been removed. The following procedure should be followed in preparing the H-f Radio Transmitter Navy Type CG-52206, I-f Radio Transmitter Navy Type CG-52205, Rectifier Navy Type CG-20122, and associated equipment for operation.

(a) Remove the major units from their outer enclosing cases. Bolt the cases securely in place, making sure that a good metal-to-metal ground is obtained. Return units to their respective cases.

(b) Connect the interconnecting cables into their proper receptacles and binding posts in accordance with External Connection Diagrams P-7764057 and P-7764056 for the Navy Models TCU-2 and TCM-2 Radio Transmitting Equipments, respectively.

(c) The equipment is now ready for operation and should be placed in service according to the instructions on the adjustment of the radio transmitters as given on Pages 12 to 15 inclusive.

XIII. THEORY OF OPERATION

A. H-f Radio Transmitter Navy Type CG-52206

Before considering in detail the procedure for adjusting Radio Transmitter Navy Type CG-52206 for operation, it is well to understand the theory of operation of the various circuits involved. By studying carefully this section with frequent reference to the schematic diagram, the operator will become more familiar with the radio transmitter and will be able to obtain the optimum performance at all times. In discussing this operation, reference will be made to the schematic diagram of the h-f radio transmitter (W7351924), and the schematic diagram of the rectifier (W-7351922).

The discussion will begin with the master-oscillator stage and continue through each succeeding stage to the antenna and finally the control circuits. The component part numbers referred to throughout this description correspond to circuit symbol designations as they appear on the schematic diagram, connection diagram, and the component parts themselves.

The master oscillator employs one Type -837 vacuum tube in an electron-coupled oscillator circuit. The electron-coupled oscillator circuit is used because of its good frequency characteristic with regard to supply voltage variations. The frequency determining circuit is composed of inductance (300); fixed capacitors (201), (202); and a variable air capacitor (200). Variable capacitor (200) is used to adjust the frequency of the circuit over any one of the four master-oscillator bands which are selected by the "MO BAND CHANGE" switch (375).

Capacitor (203) is the calibration compensating capacitor, which is adjusted from the front panel by means of a small screwdriver. This capacitor provides means for setting the m-o on calibration after changing oscillator tubes.

Capacitor (204) is the m-o tank circuit by-pass and supplies a low-impedance return circuit from tank to cathode. Capacitor (205) is the grid blocking capacitor and (265) the grid leak resistor. The suppressor grid of the m-o tube is maintained

at r-f ground potential by connection directly to the cathode. Capacitor (206) prevents a short circuit for the d-c potential on the screen grid (oscillator plate) and completes the r-f circuit to the tank. Choke coil (326) prevents any r-f from entering the keying circuits. Choke coil (316) prevents a short circuit from occurring across the r-f potential of the tank circuit. Capacitor (228) provides a short return to ground for the m-o cathode current.

The plate circuit of the m-o tube acts as a buffer amplifier and, since it is electron-coupled to the oscillator circuit through the tube, reduces the reaction on the m-o circuit to a minimum. This plate tank circuit consists of tapped inductance (301) only, it being designed to provide a broad resonance curve to eliminate the necessity for tuning other than by taps. Switch (376) operates from "MO BAND CHANGE" switch (375) and selects the correct tap so as to operate at twice the frequency of the m-o. By-pass capacitor (208) completes the r-f circuit from buffer tank to the cathode and r-f ground. Choke coil (317) serves to prevent any stray r-f voltage from returning through the d-c voltage supply. Resistor (267) is a plate voltage-dropping resistor for the m-o plate supply. The plate current for the m-o tube is indicated by m-o plate current milliammeter (340). This meter is by-passed by capacitor (211) to protect it from any stray r-f voltages.

Coupling capacitor (209) feeds the r-f excitation from the m-o plate circuit to the control grid of the first i-p-a tube and also serves to isolate the d-c plate voltage from the grid circuit.

The first i-p-a stage uses one Type -837 tube in a conventional amplifier circuit. The r-f voltage on the grid is isolated from ground by grid choke coil (318). Resistor (268) is the grid leak which is by-passed by capacitor (210). Capacitor (212) is the cathode r-f by-pass capacitor. Capacitors (213), (214), and (215) are the screen grid, suppressor grid, and plate by-pass capacitors, respectively, and maintain these points at ground potential with respect to r-f voltage, through the cathode by-pass capacitor (212). The first i-p-a tank circuit consists of tapped inductance (302), fixed capacitor (207); and variable tuning capacitor (217). "1ST IPA PLATE BAND CHANGE" switch (377) provides three bands for covering the frequency range required in this stage. Choke coil (319) prevents any stray r-f voltage from passing into the d-c plate supply source. The first i-p-a plate current is indicated by a milliammeter (341). Capacitor (216) serves as a by-pass to protect this milliammeter from stray r-f currents.

Excitation voltage for the second i-p-a stage is fed through coupling capacitor (222) to the control grid. This coupling capacitor also serves to prevent the first i-p-a d-c plate voltage from appearing on the grid circuit of the second i-p-a. One Type -837 vacuum tube is employed in a conventional amplifier circuit for this stage. The grid circuit, which is similar to the first i-p-a grid circuit, is composed of choke coil (320), grid leak resistor (271), and by-pass capacitor (218). The cathode is by-passed to ground by capacitor (219). Capacitors (220), (221), and (223) are the screen grid, suppressor grid, and plate by-pass capacitors, respectively. Inductor (303), variable tuning inductor (304), and capacitor (224) form the second i-p-a tank circuit. Band change switch (378) (banks A and B) provides coverage of the frequency range for this stage in three steps. On band 1, or the low-frequency band, inductance (303) is connected in series with inductance (304) and capacitor (224) forms the tank fixed capacity. Frequency variation is obtained by variable rotating inductance (304). On band 2, inductance (303) is removed from the circuit, leaving inductance (304) and capacitor (224) to form the tank circuit. For the highest frequency band, tap 3, capacitor (224) is removed leaving only inductor (304) in the circuit. This inductance plus the circuit stray capacity and tube capacity then form the tank circuit. Choke coil (321) is used to prevent any stray r-f voltage from returning through the d-c supply. Plate current for this stage is indicated by milliammeter (342). Capacitor (226) serves to by-pass this instrument.

The power-amplifier stage employs two Type -803 vacuum tubes in a conventional parallel amplifier circuit. Excitation for the power-amplifier stage is obtained across the second i-p-a tank circuit through coupling capacitor (225). The grid circuit is composed of choke coil (323), grid leak resistor (276), by-pass capacitor (227), and grid current meter (345) with its by-pass capacitor (230). Potentiometer grid leak (276) supplies bias to the control grids of the p-a tubes, and also, when operating on MCW or Phone, supplies voltage for the suppressor grids of the p-a tubes. Capacitors (231) and (232) are the suppressor grid and screen grid by-pass capacitors, respectively. Capacitors (223) and (234) are filament by-pass capacitors.

The power-amplifier tank circuit is similar to the second i-p-a tank circuit. "PA BAND CHANGE" switch (380) (banks A and B) is used to switch the circuit elements in the same manner as in the second i-p-a. Inductor (305) is a fixed

inductance used only on the lowest frequency band. Fixed capacitor (239) is employed on the lowest and intermediate frequency bands only. Variable tuning inductor (306) is used in all three bands and provides continuous frequency variation over each band. Capacitor (235) is the p-a tank by-pass or grounding capacitor. Choke coil (324) prevents stray r-f voltages from entering the d-c supply source. The p-a plate current is indicated by milliammeter (343). Capacitor (240) is the usual r-f by-pass for this instrument.

Because of the wide frequency range over which the radio transmitter operates, it is necessary to provide a coupling system which is very flexible. The coupling system employed here is capable of properly feeding the antenna over the entire frequency range. As may be seen from Schematic Diagram W-7351924, the full r-f voltage existing across the p-a tank circuit is coupled to the antenna system through blocking capacitor (236), which removes the d-c plate voltage, and through variable inductor (307). The antenna driving voltage is the voltage which appears across capacitor (238). The antenna matching network is composed of inductors (307) and (308) and variable capacitors (237) and (238). This system provides a means for feeding antennas which may require either current or voltage feed. When operating slightly above or below the fundamental frequency of the antenna it is generally necessary to current feed the antenna. This is accomplished by resonating capacitor (C237) with inductor (238) being set at its maximum capacity. Under these conditions inductor (307) acts as a coupling control. Adjustment of the coupling is achieved by varying inductor (307) and capacitor (237) while maintaining resonance for the current fed condition by means of inductor (308). The antenna driving voltage is made high for voltage feed by series resonating capacitors (237) and (238) with inductor (308). The greater the capacity ratio of (237) to (238), the higher the antenna driving voltage. The antenna current will be indicated by the r-f antenna ammeter (346).

Keying of the radio transmitter is accomplished by the use of a special multiple-pole keying relay (387). When energized, this relay changes the antenna from the radio receiver to the radio transmitter, grounds the connection to the receiver antenna, and removes the keying bias from the vacuum tubes, thus allowing the circuits to function and produce output. When the key is open, the cathode and filament circuit of all tubes, except the audio tube, is returned to a point in the Rectifier Navy Type CG-20122 at the junction of bleeder potentiometer resistors (620) and (621). This makes the cathode and filaments at a positive potential above ground corresponding to the voltage drop across resistor (620). The grids are then negative with respect to the cathodes by an amount corresponding to this voltage, which is made high enough to cut the tubes completely off. Closing of the keying relay shorts out resistor (620) in the rectifier and returns the cathodes to ground, which restores normal operating bias. A suitable filter is employed to reduce the ripple to a minimum. The bias filter consists of reactor (336), capacitor (254), and resistor (289). Voltage for energizing the operating coil of the keying relay is obtained from the copper oxide rectifier in the Rectifier Navy Type CG-20122. The keying relay is made to function by operating test key (386), the external telegraph key when plugged into key jack (427), or from the microphone push button when the microphone is plugged into microphone jack (426) and the "EMISSION" switch is in "PHONE" position. Capacitor (255), and resistor (290) prevent surges in the keying relay circuit.

The type of emission is controlled by the "EMISSION" switch (381) (banks A, B, C, D, E and F). This is a multibank switch that arranges the circuits in the audio stage for MCW or Phone and cuts the audio stage off for CW operation. When in the "MCW" position, the single Type -837 tube operates as an oscillator-amplifier. The grid circuit consists of grid leak resistor (283) with by-pass capacitor (247) and one winding of audio-oscillator transformer (357). The second winding of the audio-oscillator transformer composes the plate circuit of the oscillator. Capacitor (246) is employed to tune the plate circuit to approximately 1000 cycles. The plate circuit is by-passed to the cathode by capacitor (243). The screen and suppressor grid voltage is obtained from potentiometer resistor (284) and is by-passed to the cathode by capacitor (250). Resistor (282) is in the cathode return circuit of the tube and supplies self-bias for the audio tube. The plate circuit of the tube consists of modulation transformer (358) and the audio return circuit by-pass capacitor (243). Plate voltage is obtained from the 500-volt rectifier through voltage-dropping resistor (285). Milliammeter (344) indicates the audio-oscillator plate current. The usual meter by-pass capacitor (242) is shunted across this instrument.

Modulation of the power amplifier is accomplished by suppressor type modulation. It will be noted that both the second i-p-a and p-a suppres-

sors are modulated by employing two secondary windings on modulation transformer (358). Resistor (286) is a load resistance across the p-a suppressor modulation source. Modulation is indicated by voltmeter (348). Capacitor (241) is the modulation meter by-pass.

For Phone operation, the "EMISSION" switch must, of course, be changed to the "PHONE" position. This switches the audio circuits so that the Type -837 tube acts as a pentode audio amplifier. The audio-oscillator transformer is isolated from the circuit, and the microphone input transformer substituted in the grid circuit.

The microphone or line input is fed to the primary windings of microphone transformer (356). The audio gain control potentiometer (280) is connected across the output of the microphone transformer and controls the input level to the control grid of the audio-amplifier tube. The grid circuit return is by-passed from the potentiometer to cathode by capacitor (245). Resistor (281) is the grid leak.

The microphone voltage is supplied from the voltage drop across resistor (628) located in Rectifier Type CG-20122. Capacitors (251) and (248), and choke coil (335) comprise a smoothing filter to remove any ripple in the microphone voltage supply circuit.

All filament voltage is obtained through filament transformer (355). Taps on the transformer and tap switch (384) on the front panel permit adjustment for a wide range of input voltages. Fine control of the filament voltage is permitted by filament rheostat (288) and filament voltmeter (347). The filament voltmeter is protected from any stray r-f voltage by by-pass capacitor (229). Interlock (385) is provided to remove all plate voltage when the rear cover is opened to replace tubes.

Panel lamps (362) and (363) are provided, together with switches (382) and (383) to turn them off when not needed. Indicator lamp (365) shows when plate voltage is applied to the radio transmitter.

H-f Radio Transmitter Navy Type CG-52206 is designed to provide operation over the frequency band from 2000 to 18,000 kc. The design of a master-oscillator stage to cover such a wide band of frequencies would involve cumbersome switches and considerable space. It therefore becomes necessary to resort to the well-known method of doubling the frequency through an amplifier stage in order to cover the wide frequency band. This doubling may sometimes be done in two succeeding stages with a result of quadrupling the initial frequency, and if done in three succeeding stages, the m-o frequency is multiplied by eight. (Refer to Table A, below, and B, on Page 8.)

The master oscillator circuit in this radio transmitter has been designed to operate from 1000 kc to 2262.5 kc. The plate circuit (or work circuit) of the master oscillator is designed to operate always at twice the m-o frequency and is automatically tuned to double the m-o frequency by switch (376), which operates in conjunction with the "MO BAND CHANGE" switch. Thus, it will be noted that the m.o. always operates at a subharmonic of the output frequency. If, for instance, an output frequency of 2000 kc is desired, the m.o. must be tuned to 1000 kc. Should the m.o. be tuned to 2000 kc, the operator expecting 2000-kc output, the first i-p-a could not be tuned in the region of 2000 kc, but would tune at 4000 kc, since the m-o plate circuit is already tuned to twice the m-o frequency.

The frequency range covered by the various stages is shown in Table A below.

A typical tuning calibration curve covering each of the tuning controls is included in this Instruction Book and will assist the operator in establishing the approximate tuning point for any control for any frequency within the specified bands.

The figure numbers of the tuning curves are given below for each of the various controls.

"MO TUNING" (Panel control "B"): Fig. 1.

"1ST IPA TUNING" (Panel control "D"): Fig. 2.

"2ND IPA TUNING" (Panel control "F"): Fig. 3.

"PA TUNING" (Panel control "G"): Fig. 4.

Several examples of the tuning required for various output frequencies are given in Table B on Page 8.

B. I-f Radio Transmitter Navy Type CG-52205

Before considering in detail the procedure for adjusting I-f Radio Transmitter Navy Type CG-52205 to any desired frequency within its range, it is well to understand the theory of opera-

TABLE A

	M-o Grid Kc	M-o Plate Kc	First I.P.A. Kc	Second I.P.A. Kc	P.A. Kc
Minimum	1000	2000	2000	2,000	2,000
Maximum	2262.5	4525	9050	18,100	18,100

TABLE B

Desired Output Freq. (Kc)	M-o Tuning Freq. (Kc)	1st I-p-a Tuning Freq. (Kc)	2nd I-p-a Tuning Freq. (Kc)	P-a Tuning Freq. (Kc)
2,000	1000	2000	2,000	2,000
3,000	1500	3000	3,000	3,000
4,200	2100	4200	4,200	4,200
5,000	1250	5000	5,000	5,000
6,000	1500	6000	6,000	6,000
7,200	1800	7200	7,200	7,200
8,000	2000	8000	8,000	8,000
10,000	1250	5000	10,000	10,000
12,000	1500	6000	12,000	12,000
16,000	2000	8000	16,000	16,000
18,100	2262.5	9050	18,100	18,100

tion of the various circuits involved. In discussing the operation, reference is made to the i-f radio transmitter Schematic Diagram W-7351923, a copy of which is included in this Instruction Book.

Beginning with the electron-coupled oscillator stage (m.o.), this description will continue through each succeeding stage to the antenna.

One Type -837 vacuum tube (545) is employed as the electron-coupled oscillator. This tube is supplied with a plate potential of approximately 450 volts direct current from the auxiliary plate rectifier. The oscillator circuit is connected from the control grid to the screen grid, the frequency being controlled by means of tank inductance (522), band change switch (548), variable tank capacitor (450), and fixed tank capacitors (451), (452), and (496). The center connection of capacitors (451) and (452) is connected to the cathode thereby providing suitable out-of-phase voltages for master-oscillator operation. Capacitor (454) is the usual control grid d-c blocking capacitor, while resistor (504) is the grid leak. Chokes (531) and (532), and radio-frequency by-pass capacitors (456) and (457) serve to prevent the radio-frequency excitation on the screen grid and plate, respectively, from being short-circuited and from entering the supply wiring. Variable capacitor (453) is a calibration compensator provided to compensate for any change in tube capacity should the master-oscillator tube be changed. M-o cathode by-pass capacitor (459) allows radio frequency to pass from the oscillator cathode to the cathode of the following stage, thus completing the r-f excitation path. Resistor (505) is the plate-dropping resistor of the correct value to give frequency compensation when the plate and screen grid supply is varied. That is, when the voltage to the screen grid and plate is increased, the increase in voltage on the screen grid causes a decrease in frequency while an increase in plate voltage causes an increase in frequency. By the selection of the proper resistor, the decrease and increase in frequency can be made nearly equal, thus obtaining very little change in frequency when the line voltage, or plate and screen-grid supply voltage, is varied. The suppressor grid is connected directly to the cathode.

A lead is run from the control grid terminal of m-o tube (545) to an adjustable metal clamp anchored to one terminal of coupling capacitor (458). This lead, for the lack of a better name, is called a "balancing connector." The purpose is to provide a small amount of capacity coupling between these two circuits, this coupling serving to balance feedback between the plate circuit and the control and screen grid circuits of the oscillator tube, thereby minimizing reaction effects on the oscillator frequency when tuning the i-p-a grid circuit. The adjustable clamp is set for optimum coupling at the factory, and this adjustment should not be changed.

R-f excitation is coupled to the control grid of i-p-a tube (546) through capacitor (458). This stage employs one Type -837 tube. The grid circuit of this intermediate-power-amplifier stage is tuned to double or three times the frequency of the oscillator tank circuit by means of tank inductances (523) and (529) and fixed capacitor (461). "IPA GRID BAND CHANGE" switch (549), and i-p-a tank capacitor (460). The oscillator covers a band of 150 to 333.3 kc while the i-p-a grid tank circuit covers the band of 300 to 1000 kc. Resistor (506) is the i-p-a grid leak resistor. Ammeter (568) is connected in series with grid leak (506) and reads the d-c grid current. This reading is dependent on the excitation. Capacitor (484) is the customary r-f by-pass for this instrument, while capacitor (464) serves as the cathode r-f return path. Resistor (508) is the self-biasing resistor for the i-p-a tube and serves to reduce the plate voltage to approximately 450 volts direct current, when the tube is operating. It also provides a bias on the control grid of the tube if excitation fails. The screen grid is maintained at the potential of the cathode with respect to radio frequency, by means of capacitor (465), while the suppressor grid is connected directly to the cathode.

The plate circuit of i-p-a tube (546) is tuned by means of tank inductances (528) and (524), "IPA PLATE BAND CHANGE" switch (550), fixed tank capacitor (469), and variable tank capacitor (468). This circuit covers the 300- to 2000-kc band. The plate tank is connected to the cathode through capacitor (467). Direct current is series fed to the plate tank through r-f choke (534) which prevents radio frequency from getting into the d-c plate supply line. Meter (569) is the i-p-a plate ammeter, and indicates plate current. Capacitor (485) serves as the r-f by-pass for this instrument. Excitation is coupled to the control grids of p-a tubes (547) through capacitor (470). Chokes (535) and (536), and resistor (511), are the usual p-a grid chokes and grid leak, respectively.

"IPA PLATE BAND CHANGE" switch (550) shorts out p-a grid choke (536) at the higher frequencies. Capacitor (471) is the p-a grid choke by-pass capacitor. Capacitors (472), (473), and (474) are the usual p-a suppressor, screen grid, and filament by-pass capacitors, respectively. Resistor (516) is the screen grid voltage-dropping resistor.

P-a tubes (547) consist of two Type -803 tubes, connected in parallel. The plate tank circuit is tuned by means of p-a tank inductances (525) and (526), "PA BAND CHANGE" switch (551), fixed tank capacitor (476), and variable tank capacitor (495). This stage is always used as an amplifier. Capacitor (475) is the usual plate by-pass capacitor and (537) is the p-a plate r-f choke. Ammeter (571) is the p-a plate ammeter, and is by-passed for r-f, by capacitor (488). A voltage of approximately 1350 volts direct current is series fed to the p-a plate tank. Resistor (509) is the p-a self-biasing resistor and holds the plate current to a safe value in case the excitation is removed. D-c grid current of the p-a stage is read on milliammeter (570), while capacitor (486) is the usual r-f by-pass for this instrument.

The p-a stage is inductively coupled to the antenna by means of coupling coils (520) and (521), the coupling being varied by means of switch (552) and taps on the coupling coils. The antenna is tuned by means of antenna variometer (527), antenna loading coil (530), "ANTENNA BAND CHANGE" switch (553), and antenna fixed series capacitor (494). It will be noted that this capacitor is of the variable, air-dielectric type, but that no panel control is provided. This unit is set to its optimum value for the recommended antenna and locked in place at the factory. For other antennnae readjustment of (494) may be required. The antenna series capacitor and variometer are used to tune the antenna in the band ranging from approximately 800 to 2000 kc, while the variometer is used alone in the band from about 620 to 1000 kc. The variometer and loading coil are used together in the 300 to approximately 640-kc band. Antenna ammeter (574) is connected in the high-potential end of the antenna circuit and indicates antenna current. The exact arrangement of antenna loading for any particular frequency will, of course, vary somewhat depending upon the type of antenna being used and the surroundings.

The audio-oscillator stage employs one Type -837 tube (544). The tank circuit, which tunes to a frequency of approximately 1000 cycles, is of the Hartley type, and comprises audio transformer (581) and tank capacitor (490). The secondary of transformer (581) couples audio voltage to the suppressors of the p-a tubes. When modulating, a negative bias is obtained from p-a grid leak (511) and applied to the suppressor grids through secondary of transformer (581). Capacitor (491) is the usual plate and audio by-pass unit. Capacitor (492) is the grid blocking capacitor. Resistor (513) is the grid leak. Resistor (512) drops the plate voltage to approximately 450 volts direct current and resistors (514A and 514B) drop the voltage on the screen grid to 180 to 200 volts direct current. CW to MCW switch (554) changes the circuits from CW to MCW transmission. When this switch is in the "MCW" position, a negative bias is automatically applied to the p-a suppressor grid, and plate voltage is supplied to audio-oscillator tube (544). Ammeter (572) indicates the audio-oscillator tube plate current, capacitor (489) being the customary r-f by-pass for this instrument.

Keying relay (577), in the "key up" position, connects the radio receiver to the antenna. In the "key down" position, the antenna is connected to the radio transmitter, and the antenna terminal of the radio receiver is grounded. In the "key up" position, all the transmitter tubes except the audio oscillator are biased to cutoff by applying a positive voltage from the auxiliary plate rectifier potentiometer to the cathodes of the transmitter tubes. This is, in effect, the same as applying a negative bias to the control grids of the tubes. In the "key down" position, the bias is removed by shorting that portion of rectifier bleeder (620) which supplies the bias, thus connecting the cathodes to ground.

Voltage for energizing the operating coil of the keying relay is obtained from the copper oxide rectifier in Rectifier Navy Type CG-20122. Ca-

pacitor (497) and resistor (517) prevent surges in the keying relay circuit.

Filament voltage for the transmitter tubes is obtained from transformer (580). Tap switch (555) is used to select the correct transformer tap depending on the supply voltage. When the voltage is 125, tap 1 is used; 115 volts, tap 2; 105 volts, tap 3; and 95 volts, tap 4. Rheostat (515) is used to maintain the filament voltage of the tubes at exactly rated voltage. The filament voltage is indicated by filament voltmeter (573), which is connected across one-half of the m-o tube filament winding and should be set to 6.3 volts, as indicated by a red line on the meter dial for correct adjustment.

Panel lamps (566) and (567) serve to illuminate the panel controls and instruments, and switches (556) and (557) may be used to turn these lamps off when they are not needed. Plate indicator lamp (564) shows when plate voltage is being supplied to the radio transmitter. Test key (558) is provided to enable the keying circuit to be closed conveniently at the panel when making tuning adjustments. Jack (589) provides for plugging in the telegraph key. When keying from a Navy four- or six-wire control unit, leads must be connected from terminals "7" and "8" of Control Unit Navy Type CG-23241 to key jack (589). See External Connection Diagram P-7764057.

The required frequency ranges of the various stages, as listed on the following page, should be followed when tuning the radio transmitter.

C. Rectifier Navy Type CG-20122

In discussing the theory of operation of Rectifier Navy Type CG-20122, reference is made to Schematic Diagram W-7351922. Consideration of this diagram shows that Rectifier Navy Type CG-20122 includes the main plate rectifier, the auxiliary plate rectifier, and the keying and bias circuit rectifier.

The main plate rectifier is of the single-phase, full-wave type employing two Type -836 high-vacuum rectifier tubes (643). Plate energy for these tubes is supplied from plate transformer (680). Reactor (686) and capacitors (602) and (603) provide the necessary filter for the main plate rectifier so that the peak voltage ripple in the rectifier d-c output does not exceed one per cent. The output voltage of this rectifier under full load is approximately 1350 volts direct current. The voltage regulation of this rectifier, key-up to key-down conditions, radio transmitter adjusted at rated output, is approximately 10 per cent. Resistors (628 A and B), in series with the reactor (686) to ground, are used for obtaining microphone voltage for the Navy Type CG-52206 H-f Radio Transmitter, inasmuch as a voltage of 6–8 volts is built up across these resistors when the rectifier is loaded by the radio transmitter.

REQUIRED RANGE OF STAGES

I-f Radio Transmitter Navy Type CG-52205

M-o Freq. (Kc)	I-p-a Grid Freq. (Kc)		I-p-a Plate Freq. (Kc)		P-a Freq. (Kc)
	Dblr	Tplr	Ampl	Dblr	
150*	300*		300*		300*
150	300			600	600
200	400		400		400
200	400			800	800
223	446		446		446
223	446			892	892
300	600		600		600
300	600			1200	1200
333.3*	666.6			1333.2	1333.2
222.2		666.6		1333.2	1333.2
250		750		1500	1500
300		900		1800	1800
333.3*		1000.0*		2000*	2000*

* Limiting frequencies covered by circuit.

NOTE:

1. For output frequencies of 300 to 1333.2 kc, the i-p-a grid circuit should be used as a doubler.
2. For output frequencies of 1333.2 to 2000 kc, the i-p-a grid circuit should be used as a tripler.
3. For output frequencies of 300 to 600 kc, the i-p-a plate circuit should be used as a straight amplifier.
4. For output frequencies of 600 to 2000 kc, the i-p-a plate circuit should be used as a doubler.

Bleeder resistors (615), (616), (617), and (618), are provided in the Rectifier Navy Type CG-20122 and connected across the output circuit of the main plate rectifier for the purpose of securing the proper regulation and for discharging the filter capacitors.

The auxiliary plate rectifier is also of the single-phase, full-wave type employing two Type -836 high-vacuum rectifier tubes (644). Filament energy for these tubes is also supplied from filament transformer (683). Plate voltage is supplied from plate transformer (681). Reactor (687) and

capacitors (600) and (601) provide the necessary filter for the auxiliary plate rectifier so that the peak voltage ripple in the rectifier d-c output does not exceed one per cent. A safety gap, connected between the high-potential terminal of reactor (687) and ground, serves to protect this rectifier from high-voltage surges. This gap is adjusted to a spacing of 0.040 inch. The output voltage of this rectifier under full load is approximately 500 volts direct current. The voltage regulation of this rectifier, key-up to key-down condition, under full-load operation, is approximately 10 per cent.

Bleeder resistors (620) to (627) inclusive, are provided in Rectifier Navy Type CG-20122 and connected across the output circuit of the auxiliary plate rectifier for the purpose of securing the proper regulation for voltage for the screen grids of the Type -837 transmitter tubes, for keying voltage, and for discharging the filter capacitors.

The keying and bias circuit rectifier is of the full-wave, copper-oxide type. A-c voltage for this rectifier is supplied from the transformer (682). Approximately 55 volts direct current are obtained from this rectifier for operating the keying relay in the radio transmitter, and for bias supply to H-f Radio Transmitter Navy Type CG-52206.

Secondary taps are provided on transformer (682) so that more voltage can be obtained from the transformer to take care of aging of the copper-oxide rectifier unit. Thus a d-c voltage of about 55 volts is always available for operating the d-c relays and supplying bias.

Line-tap switch (648) is provided for maintaining the correct output voltages from transformers (680), (681), (682), and (683) for various line voltages. Tap 1 is used when the line voltage is 125, tap 2 for 115, tap 3 for 105, and tap 4 for 95 volts. Rheostat (630) is used to maintain filament voltmeter (665) at exactly 6.3 volts. Panel lamp (661) will light when the filament transformer is energized, but when light from this lamp is not required it may be shut off by means of lamp switch (647). Power tap switch (649) is used to change the taps on the primary of plate transformer (680) so as to reduce the output voltage and hence the power output from the radio transmitter.

The following is a description of the operation of the control circuits. Reference should be made to the following drawings:

W-7351922 Schematic Diagram, Rectifier Navy Type CG-20122

K-7877856 Schematic Diagram, Control Unit Navy Type CG-23241

P-7764057 External Connection Diagram, Navy Model TCU-2 Radio Transmitting Equipment

P-7764056 External Connection Diagram, Navy Model TCM-2 Radio Transmitting Equipment

"Start-stop" control of Rectifier, Navy Type CG-20122 may be had from two locations, i.e., from Control Unit Navy Type CG-23241 or from the remote four- or six-wire control unit furnished by the Navy. Transfer of the operating location is accomplished by "REMOTE-LOCAL" switch (1755) on Control Unit Navy Type CG-23241.

To start or stop the equipment from Control Unit Navy Type CG-23241, the following steps should be followed.

1. Place "REMOTE-LOCAL" switch (1755) in the "LOCAL" position. Close main line switch (651) on the rectifier panel.
2. Close "START-STOP" switch (651). This switch will remain closed hereafter.
3. Starting contactor (672) is then actuated by placing "START-STOP" switch (1756) or (1757) in the "START" position. Switch (1756) is a tumbler switch provided for four-wire control installations. Switch (1757) is a push-button switch provided for six-wire control installations. Relay (1765) is energized, thus causing terminals "5" and "6" of terminal board (714) to be shorted out and completing the circuit for relay (672). The filaments of all tubes are now lighted.
4. The 40-second time delay relay (674) connected across the filament supply is actuated, permitting plate voltage to be applied 40 seconds after the filaments are energized. A-c voltage is applied to the primaries of plate transformers (680) and (681) by means of plate contactor (673); the coil of (673) is energized when the time delay relay (674) closes.
5. To stop rectifier Navy Type CG-20122, place switch (1756) or (1757) in the "STOP" position.

To start and stop the equipment from a remote four- or six-wire Navy control unit, place the "REMOTE-LOCAL" switch in the "REMOTE" position. All other steps

are the same as above except that the "START-STOP" switch of the four- or six-wire control unit is used in place of switch (1756) or (1757).

Indicator lamp (1760) in Control Unit Navy Type CG-23241 informs the operator that power has been placed on the Rectifier Navy Type CG-20122.

Switch (1758) is the "EMERGENCY-STOP" switch.

When the equipment is started in the above manner, it is assumed that all the interlocks are closed, including switch interlocks (648) and (649) and door interlock (653). Plate voltage may then be turned on or off by means of plate switch (650).

Suitable protection of Rectifier Navy Type CG-20122 against overloads and short circuits is provided by means of line switch and breaker (654), bias fuse (694), filament fuses (698) and (690), primary fuse (697), main-plate-rectifier high-voltage fuse (695), and auxiliary-rectifier high-voltage fuse (696). Switches (655), (656), and (657), and receptacle (711) are provided for gas engine operation. These components do not enter into the operation of the Navy Models TCM-2 and TCU-2 Radio Transmitting Equipments.

D. Control Unit Navy Type CG-23241

Refer to Schematic Diagram K-7877856. The purpose of Control Unit Navy Type CG-23241 is to enable the radio transmitter to be controlled from Navy remote control units (four- or six-wire). Transformer (1770) is a 110-volt transformer which enables point A to be grounded when the four-wire control is used. Links are provided on transformer (1770) which permit its operation from either 110- or 220-volt a-c input. Switch (1755) is the "LOCAL-REMOTE" switch which provides for transmitter control from Control Unit Navy Type CG-23241 when placed in the "LOCAL" position. It provides for transmitter control from a Navy four- or six-wire control unit when placed in the "REMOTE" position. Switch (1756) is the "START-STOP" tumbler type switch used in Control Unit Navy Type CG-23241 for four-wire Navy Control Units. Switch (1757) is the "START-STOP" push-button type switch used in Control Unit Navy Type CG-23241 for six-wire Navy Control Units. The radio transmitter may be stopped in emergencies by throwing switch (1758). This switch causes power to be removed from Rectifier Navy Type CG-20122 regardless of any manipulations from the remote control units. Operation of the radio transmitter cannot be resumed until the "EMERGENCY-STOP" switch is restored to the closed position.

Two links are provided for changeover of control units from the four- to the six-wire Navy Control Units. Link F-G is in place for six-wire units; link C-A is removed. For four-wire units link C-A is in place, and link F-G removed.

Relay (1765) is a starting contactor; two of its contacts closing starting-contactor (672) circuit in Rectifier Navy Type CG-20122. Another of its set of contacts provides a push-button interlock circuit for six-wire control operation. This interlock circuit is completed through link F-G. A third set of contacts completes the circuit for the indicator lamps in the remote control units informing the operator that power has been placed on the Rectifier Navy Type CG-20122. Control Unit Navy Type CG-23241 is also provided with indicator lamp (1760). Resistor (1750) in series with relay coil (1765) permits shorting of the coil by the "STOP" push buttons without shorting the voltage supply.

When keying from a remote station, leads must be provided from key jack (1427) or (589) on the radio transmitter to terminals "7" and "8" on Control Unit Navy Type CG-23241.

XIV. ADJUSTMENTS

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE ON; DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION; BUT ALWAYS SHUT DOWN RECTIFIER OR OTHER POWER EQUIPMENT AND OPEN THE MAIN SWITCH IN SUPPLY LINE TO EQUIPMENT.

Before starting the radio transmitter for the first time, the external cable connections should be checked to make sure that all connections are tight and that the plugs are in place. Make sure the ground connections are properly and securely connected. Attach the antenna to the terminal provided.

Voltmeter (668) in the Rectifier Navy Type CG-20122 indicates the line voltage. For a voltage of 95 volts, set the rectifier line tap switch (648) on tap 4; for 105 volts use tap 3; for 115 volts use

tap 2; and 125 volts, set the switch on tap 1. Likewise filament tap switches (384) or (555) in either the h-f or i-f radio transmitter should be set in the same manner. Next, set the filament control in the rectifier and radio transmitter at the center of the scale. Set the "POWER TAP" switch on the rectifier on tap 1 for reduced power. The equipment is now ready to be operated.

A. H-f Radio Transmitter Navy Type CG-52206

The following procedure is recommended for tuning H-f Radio Transmitter Navy Type CG-52206 to any frequency within the 2000 to 18,100-kc band. Assume that the desired frequency is 18,100 kc.

1. Set "REMOTE-LOCAL" switch (1755) in the "LOCAL" position. Close main line switch (654) on the rectifier panel.

2. Place transmitter-rectifier "START-STOP" switch (651) on the rectifier panel, in the "START" position. When the "START-STOP" switch is in the "START" position, the panel illuminating lamps should light, showing that power has been applied to the equipment. Panel lamp switches should be in the "ON" position. Throw "START-STOP" switch (1756) or (1757) on the control unit in the "START" position.

3. Adjust the rectifier filament voltage to 6.3 volts by means of rectifier filament rheostat (630), and also adjust the transmitter filament voltage to 6.3 volts by means of transmitter filament rheostat (288). Plate voltage will be applied to the radio transmitter 40 seconds after the equipment has been started.

4. Place "EMISSION" switch (381) in the "CW" position.

5. Place "POWER TAP" switch (649) on the rectifier panel on tap 1. The plate voltage will thus be reduced to approximately 600 volts on the power-amplifier tubes while preliminary tuning of the low-power stages is accomplished.

6. Set "MO BAND CHANGE" switch (A) on tap 4. Depress "TEST KEY" and adjust "MO TUNING" control (B) to a dial setting of approximately 2100. The frequency at this point should be about 2262.5 kc. By referring to sample tuning chart (Fig. 1), the operator will be guided in adjusting the m.o. to any frequency within its range.

   If accuracy greater than this approximate calibration is required, it will, of course, be necessary to employ some form of frequency meter or standard with which to accurately set the master oscillator. The sample tuning charts supplied with this Instruction Book are not to be used for accurate frequency setting. They are supplied only as a guide to the operators in order to familiarize them with the general settings of the various controls.

7. Set "1ST IPA BAND CHANGE" switch (C) on tap 3 and resonate "1ST IPA TUNING" control (D) at a dial setting of approximately 93; at this point resonance is indicated by a dip in plate current of the first i-p-a plate ammeter and also by a reading of maximum current on the second i-p-a plate ammeter. The plate tank circuit of the first i-p-a is now resonating at twice the frequency of the m-o plate circuit, or 9050 kc. The m-o plate circuit is tuned automatically to twice the frequency of the m-o oscillator by means of a tapped inductance (301) controlled by the "MO BAND CHANGE" switch.

   The sample tuning chart, Fig. 2, will aid the operator in tuning the first i-p-a plate circuit.

8. "PA BAND CHANGE" switch (E) must always be set to the proper band before tuning the second i-p-a tank circuit as this switch also selects the proper band for the second i-p-a as well as for the p-a.

   Set "PA BAND CHANGE" switch (E) on tap 3, and resonate "SECOND IPA TUNING" control (F) at a dial setting of approximately 1770, until resonance is indicated by a dip in plate current of the second i-p-a plate ammeter and by a maximum reading of the p-a grid ammeter. The sample tuning chart, Fig. 3, will aid the operator to tune this stage.

9. Before resonating the power amplifier tank circuit, set "OUTPUT TUNING" inductor (J) at the middle of its operating scale, namely, 1800, and "OUTPUT TUNING CAPACITOR" (H), at 50. Also set "ANTENNA TUNING" inductor (L) in the middle of its range, namely 1800, and

"ANTENNA TUNING CAPACITOR" (K) at 100. The antenna should be connected to the proper terminals on the H-f Radio Transmitter Navy Type CG-52206.

The "TEST KEY" should be depressed and the power amplifier tuned to resonance by rotating "PA TUNING" control (G). Resonance will be indicated by a dip in plate current of the p-a plate ammeter. The sample tuning chart, Fig. 4, will aid the operator in tuning this stage. For the operating frequency of 18,100 kc, the approximate setting of the p-a tuning control will be about 1560.

10. Place "POWER TAP" switch (649) on the rectifier panel on tap 3. This brings the power-amplifier voltage up to normal for operating conditions.

11. It should be remembered throughout the tuning procedure of the antenna that the power-amplifier tank circuit should be maintained at resonance. A slight retuning of power-amplifier control (G) after each adjustment of the antenna tuning controls will do this. With the power-amplifier tank circuit tuned to resonance, "ANTENNA TUNING" inductor dial setting (L) should be increased or decreased until the power-amplifier plate current rises. Also, "OUTPUT TUNING CAPACITOR" (H) should be increased or decreased to obtain a rise in power-amplifier plate current. This will change the resonant point of the power-amplifier tank circuit, and the power-amplifier tank capacitor should be returned to the new resonance point. In most cases, "OUTPUT TUNING CAPACITOR" (H) should be kept near the maximum dial setting, especially when operating at the lower frequencies. "ANTENNA TUNING" inductor (L) and "OUTPUT TUNING CAPACITOR" (H) should be varied until the power-amplifier plate current is approximately 0.230 to 0.250 ampere. If the p-a cannot be loaded up to the proper value of plate current, "OUTPUT TUNING" inductor (J) should be rotated in the direction of increasing power-amplifier plate current.

    Each time the current is raised, power-amplifier tank capacitor (G) should be retuned for resonance. This should be done until the power-amplifier plate current is 0.230 to 0.250 ampere. In some cases where the operating frequency is near an odd quarter of a wavelength of the antenna, the input resistance of the antenna will be low. In this case, it may be necessary to reduce the dial setting of "ANTENNA TUNING CAPACITOR" (K) in order to load the power amplifier up to the required plate current.

Approximate settings for several frequencies throughout the band are given below for a typical antenna. It should be remembered that these settings are approximate, since other antennas, as well as the location of the antenna with respect to other objects, can change the dial settings appreciably.

Care should be taken not to operate the radio transmitter on full power if the antenna circuit has not been properly resonated. This is due to the fact that the antenna equipment must tune antennas whose resistance and reactance vary from very low values to very high values. This requires a very flexible system providing step-up or step-down in voltage from the power-amplifier tank circuit and consequently great care should be exercised in tuning.

For maximum step-down in voltage where a low-resistance antenna is used, the voltage is made low for current feed by resonating output tuning capacitor (237) with antenna tuning inductor (308), antenna tuning capacitor (238) being set at its minimum capacity (maximum dial reading). The resonated network is driven across its capacitive section at relatively high impedance as matched by adjustment of output tuning inductor (307) for optimum power transfer. In the case of high-resistance antennas, the driving voltage is made high for voltage feed by series resonating output tuning capacitor (237) and antenna tuning capacitor (238) with antenna tuning inductor (308). The greater the capacity ratio of (237) to (238), the higher the antenna driving voltage. As in the case of current feed, the resonated network is driven across the capacitive section (237) by inductor (307).

To provide for MCW and Phone operation, the radio transmitter should first be tuned properly on CW as outlined in the foregoing and the following procedure carried out:

12. To provide MCW operation, place "EMISSION" switch (381) first in the "PHONE" position. With the "TEST KEY" closed, adjust the "MCW-PHONE CARRIER" control until the power-amplifier plate cur-

rent is between 110 and 120 milliamperes. Now set the "EMISSION" switch in the "MCW" position. This starts the audio oscillator-modulator tube and provides the proper modulation for MCW. With the "TEST KEY" closed, the modulation indicator meter should read approximately 75 to 80 volts, which is the correct value for MCW operation.

13. To provide Phone operation, it is necessary to place "EMISSION" switch (381) in the "PHONE" position. If the "MCW-PHONE CARRIER" control has been set as outlined in Paragraph 12, above, no further adjustments are necessary. Assuming that it has not been set, the same procedure should be followed, namely, close "TEST KEY" and adjust the "MCW-PHONE CARRIER" control until the power-amplifier plate current is between 110 and 120 milliamperes. Placing the "EMISSION" switch in the "PHONE" position connects the audio amplifier-modulator tube. The radio transmitter is now ready to be modulated from the microphone. By producing a steady tone with the voice or a low steady whistle into the microphone (microphone key depressed), the modulation indicator will read. Adjust "AUDIO GAIN" control (280) until the modulation indicator reads approximately 75 to 80 volts on steady modulation, or if ordinary voice modulation, the peak swing should not exceed approximately 75 volts. In general, this will provide a good 80 to 90 per cent modulation on peaks of modulation.

In the foregoing, the procedure for operating the radio transmitter as outlined was given on the assumption that the operator was not familiar with it to any considerable extent, and also that settings for the transmitter controls at that particular frequency had not been recorded. The operation of the radio transmitter will, of course, become considerably simplified after the operator becomes more familiar with the tuning of the various circuits and also after complete settings have been recorded on the tuning chart for all the frequencies ordinarily used.

B. I-f Radio Transmitter Navy Type CG-52205

The following procedure is recommended for tuning I-f Radio Transmitter Navy Type CG-52205 to any frequency within the 300- to 2000-kc band. Assume that the desired frequency is 2000 kc.

1. Set "REMOTE-LOCAL" switch (1755) in the "LOCAL" position. Close main line switch (654) on the rectifier panel.

2. Plate transmitter-rectifier "START-STOP" switch (651) on the rectifier panel in the "START" position. When the "START-STOP" switch is in the starting position, the panel illuminating lamps should light, showing that power has been applied to the equipment. Panel lamp switches should, of course, be in the "ON" position. Throw "START-STOP" switch (1756) or (1757) on the control unit in the "START" position.

3. Adjust the rectifier filament voltage to 6.3 volts by means of rectifier filament rheostat (630), and the transmitter filament voltage to 6.3 volts by means of transmitter filament rheostat (515). Plate voltage will be applied to the radio transmitter 40 seconds after the equipment has been started.

4. Place "EMISSION" switch (554) in the "CW" position.

5. Place "POWER TAP" switch (649) on the rectifier panel on tap 1. The plate voltage will thus be reduced to approximately 600 volts on the p-a tubes.

6. Set "MO BAND CHANGE" switch (A) on tap 6. Depress the "TEST KEY" and adjust "MO TUNING" control (B) to a dial setting of approximately 1880. The frequency at this point will be about 333.3 kc. The sample tuning chart, Fig. 5, will aid the operator to tune this stage.

7. Set "IPA GRID BAND CHANGE" switch (C) on tap 4 and resonate "IPA GRID TUNING" control (D) to a dial setting of approximately 72; at this point resonance is indicated by the maximum reading of the i-p-a grid ammeter. This circuit is now resonant at three times the frequency of the m.o. or 1000 kc. The sample tuning

chart, Fig. 6, will aid the operator to tune this circuit.

8. Set "IPA PLATE BAND CHANGE" switch (E) on tap 5 and resonate "IPA PLATE TUNING" control (F) to a dial setting of approximately 97. At this point, resonance is indicated by observing the minimum dip in plate current on the i-p-a plate ammeter and maximum grid current on the p-a grid ammeter. The sample tuning chart, Fig. 7, will aid the operator to tune this stage, the plate circuit in this case being resonated to a frequency of 2000 kc.

9. Set "PA PLATE BAND CHANGE" switch (G) on tap 6 and tune "PA TUNING" control (H) to approximately 82, for a frequency of 2000 kc. Resonance is indicated by observing the minimum dip in plate current of the p-a plate ammeter. The sample calibration sheet, Fig. 8, will aid the operator to tune this stage.

10. Set "ANTENNA COUPLING" switch (J) on tap 1, then set "ANTENNA BAND CHANGE" switch (K) on tap 13 and resonate the antenna by means of "ANTENNA TUNING" control (L). Resonance is indicated by a maximum reading of antenna current. The "ANTENNA COUPLING" should be increased to tap 2 or 3 until a maximum reading of antenna current is obtained when "ANTENNA TUNING" control (L) is varied. The minimum coupling tap should be used wherever possible as this gives minimum coupling to the antenna. In general, a higher coupling tap is required as the frequency is increased.

11. Now set the "POWER TAP" switch on Rectifier Navy Type CG-20122 to tap 3 and adjust the "PA" and "ANTENNA TUNING" controls for their final adjustment. As a rule, it will not be necessary to vary the "POWER TAP" switch once all the settings are known for various frequencies as all the controls can be set nearly correct before tuning the circuit for exact resonance. The *p-a plate current* should *never* exceed a value of 350 milliamperes. An average value of 320 milliamperes is recommended.

12. To obtain "MCW" operation, place the "CW-MCW EMISSION" switch in the "MCW" position. The transmitter carrier will then be modulated approximately 90 to 95 per cent at an audio frequency of about 1000 cycles.

In the foregoing, the procedure for operating the radio transmitter was given on the assumption that the operator was not familiar with the equipment, and also that settings for the transmitter controls at that particular frequency had not been recorded. The operation of the radio transmitter will, of course, become considerably simplified after the operator becomes more familiar with the tuning of the various circuits and also after complete settings have been recorded on the tuning chart for all the frequencies ordinarily used.

The tuning calibration curves included are representative curves to be used only as a guide in tuning the radio transmitter. If greater accuracy is required, a frequency standard should be employed with which to set the master-oscillator frequency.

XV. TYPICAL PERFORMANCE DATA

Frequency (kc)	2000	3500	4500	9000	12,000	18,100
"PA BAND CHANGE" SWITCH (E)	1	2	2	3	3	3
"PA TUNING" (G)	230	725	1065	1050	1300	1560
"OUTPUT TUNING" INDUCTOR (J)	0	0	0	0	1240	1773
"OUTPUT TUNING CAPACITOR" (H)	40	48	86	100	100	100
"ANTENNA TUNING" INDUCTOR (L)	0	0	0	1924	2475	2923
"ANTENNA TUNING CAPACITOR" (K)	0	100	100	100	100	100
"PA PLATE CURRENT"	240	240	240	240	240	235
"ANTENNA CURRENT"	2.9	0.6	0.6	0.9	1.2	0.5

XV. TYPICAL PERFORMANCE DATA (CONT.)

The table below gives typical meter readings and control settings for operation into a typical antenna:

Control or Meter	2000 Kc			12,000 Kc			18,000 Kc		
A	1			2			4		
B	662			2140			2059		
C	1			3			3		
D	32			46			93		
E	1			3			3		
F	470			1400			1761		
G	208			723			1511		
H	21			86			87		
J	0			2500			2608		
K	100			100			97		
L	0			2540			3055		
	CW	MCW	VOICE UNMOD	CW	MCW	VOICE UNMOD	CW	MCW	VOICE UNMOD.
M-o Plate Current	19	19.5	19	19.5	19	19	26	25	25
1st IPA Plate Current	30	26	25	34	34	34	27	26	26
Mod. Plate Current		32	40		34	43	38	37	39
Modulation Indicator		82.7			80				
2nd IPA Plate Current	65	56	60	34	36	33	38	37	39
PA Grid Current	54	50	56	28	30	31	26	28	29
Pa Plate Current	300	120	110	260	120	110	275	120	110
Rectifier Plate Voltage	1350	1350	1350	1350	1350	1350	1350	1350	1350
Antenna Current	2.7	1.3	1.3	2.1	1.0	1.0	1.7	.85	.85
Filament Volts	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3

Approximate settings for several frequencies throughout the band are given for a typical antenna:

Control or Meter	300 Kc		500 Kc		1000 Kc		2000 Kc	
"A"	1		4		4		6	
"B"	1040		1980		1980		1880	
"C"	1		2		2		4	
"D"	23		69		69		72	
"E"	1		2		4		5	
"F"	30		82		90		97	
"G"	1		2		4		6	
"H"	20		64		70		82	
"J"	4		2		2		2	
"K"	2		8		11		13	
"L"	43		50		34		90	
	CW	MCW	CW	MCW	CW	MCW	CW	MCW
PA I_p	320	145	300	120	300	120	300	120
PA I_g	41	43	42	44	40	41	28	29
IPA I_p	28	29	32	33	31	32	27	27
IPA I_g	4.6	4.7	4.6	4.7	4.6	4.7	1.3	1.3
Audio Oscillator I	.....	18	.....	18	.....	18	.....	18
Rectifier E	1320	1330	1320	1330	1330	1340	1340	1350
Antenna Current	4.8	2.5	5.4	2.8	5.7	2.9	2.9	1.5

XVI. MAINTENANCE

Tubes may be replaced and contacts of relays and contactors adjusted through the access doors on the rear shields of the radio transmitters and the rectifier. Further servicing and repairs to any unit may be conveniently made by removing the chassis from its case.

To remove a radio transmitter or rectifier chassis from its case, first fold the lamps against the panel and then place the unit on its face, front panel down. The unit now rests on the handles. Remove the rear shield by loosening the large screws. The case can now be removed by pulling it off vertically. The unit is now completely exposed except for the shields enclosing the m-o and i-p-a stages in the radio transmitters. These shields can be unfastened by removing the screws holding them in place.

The radio transmitters and the rectifier should be inspected periodically to make sure that all parts are operating successfully. Dust should be kept off all parts of the radio transmitters, particularly the master-oscillator air-tank capacitors, and all parts which operate at high potential. The various electrical connections should be kept tight at all times.

The bearings of the various tuning controls should be lubricated occasionally with a light oil, Navy Symbol 5065.

The various relays and contactors incorporated in the radio transmitters and the rectifier are adjusted at the factory and should require little attention. Instructions on the care and operation of the various relays are included in the rear of this Instruction Book.

The contacts of the transmitter keying relay should be kept properly lined up. After long service, should the contacts become pitted, they may be smoothed by means of a piece of crocus cloth. The ball bearings on the end of the armature shaft should be periodically lubricated with oil, Navy Symbol 5065.

Keying relay (387) of the h-f radio transmitter and relay (577) of the i-f radio transmitter are identical. The adjustment of this relay should be checked as outlined below:

a. Rotate the armature shaft so that the armature rests tightly against pole shoes (relay closed position). Adjust armature stop screw to secure a spacing of 0.043 inch. ±0.001 inch between top of armature and bottom of stop screw. Lock stop screw in this position with its lock nut.

b. With the armature at rest against the stop screw (relay open position), adjust the contact spacing of the two large normally open contacts (at extreme right) to 0.031 inch ±0.001 inch.

c. Insert a 0.004-inch thick shim between the armature and the stop screw and adjust the two large normally closed contacts so that they barely touch when the armature is at rest against the shim and stop screw. Remove the shim.

d. With the armature at rest against the stop screw, adjust the contact spacing of the small normally open contacts at extreme left to 0.035 inch ±0.001 in.

e. With the armature at rest against the stop screw, adjust the contact spacing of the other small contacts to 0.023 inch ±0.001 inch.

f. The ball-bearing pivot screws at each end of the armature shaft should be adjusted such that the armature shaft is free to rotate but has no "play" axially.

g. Adjust the spring tension so that the relay will give clean keying at any speed up to 40 words per minute.

Fuses in the rectifier should be checked occasionally to be sure none of them have been blown or damaged, although defective fuses will generally be indicated at once by improper functioning of some part of the equipment.

XVII. LOCATION AND CORRECTION OF TROUBLES

A. Operation "START-STOP" switch (1756) or (1757) does not close starting contactor (672).

1. Line switch (654) or "START-STOP" switch (651) not closed.
2. Line breaker (incorporated as part of line switch (654)) open due to overload or short circuit. Switch handle will be in middle position, and must be first thrown down to "OFF" position, then returned to "ON" position.
3. A-c line to Rectifier Navy Type CG-20122 not connected. In this case, line voltmeter (668) will not read.
4. A-c line to Control Unit Navy Type CG-23241 not connected.

5. "EMERGENCY-STOP" switch in "STOP" position.
6. "REMOTE-LOCAL" switch in "REMOTE" position.

B. Using Navy remote control unit (four- or six-wire) "START-STOP" switch, starting contactor (672) will not close.

1. Same as A-1
2. Same as A-2
3. Same as A-3
4. Same as A-4
5. Same as A-5
6. "REMOTE-LOCAL" switch in "LOCAL" position.
7. Links C-A or F-G not correctly positioned for type of control unit being used.

C. With remote control "START-STOP" switch "OFF," starting contact (672) remains closed.

1. Link not removed between terminals "5" and "6" on rectifier terminal board (714).

D. No filament voltage on rectifier tubes.

1. Filament fuse (698) open.
2. Filament rheostat (630) open.

E. Rectifier filament voltage cannot be adjusted to correct value (6.3 volts on voltmeter (665)) by means of filament rheostat (630).

1. Line tap switch (648) not set to correct position for available line voltage.

F. No filament voltage on transmitter tubes.

1. Filament fuse (699) open.
2. Filament rheostat (288) (h-f radio transmitter) or (515) (i-f radio transmitter) open.

G. No auxiliary plate voltage.

1. Defective rectifier tube(s) (644).
2. Plate contactor (673) failed to close.
3. Time-delay relay (674) failed to close.
4. Door interlock (653) open.
5. Switch interlock (648) or (649) open.
6. Plate switch (650) open.
7. Plate rectifier fuse (697) open.
8. Auxiliary plate fuse (696) open.

H. No main plate voltage.

1. Defective rectifier tube(s) (643).
2. Same as G-2
3. Same as G-3
4. Same as G-4
5. Same as G-5
6. Same as G-6
7. Same as G-7
8. Main plate fuse (695) open.

I. Auxiliary plate voltage less than 475 or more than 500 volts (key-down, full-load condition).

1. Defective rectifier tube(s) (644).
2. Line tap switch (648) not in correct position for existing line voltage.

J. Main plate voltage less than 1240 or more than 1350 volts (key-down, full-load condition).

1. Defective rectifier tube(s) (643).
2. Same as I-2 above.
3. "POWER TAP" switch not in position "3."

K. Keying relay (387) (h-f radio transmitter) or (577) (i-f radio transmitter) does not function properly.

1. Relay out of adjustment. Readjust following detailed instructions as given under "XVI. MAINTENANCE" section.
2. Output voltage of copper-oxide rectifier unit low due to aging. Shift to next higher secondary tap (82-volt, 90-volt, or 98-volt) on transformer (682), so that d-c output of rectifier measures approximately 55 volts.
3. Interlock contacts on p-a band-change switch (380) not closed properly (applies only if using h-f radio transmitter).
4. Interlock contacts on p-a band-change switch (551) not closed properly (applies only if using i-f radio transmitter).
5. Interlock contacts on coupling switch (552) not closed properly (applies only if using i-f radio transmitter).
6. Interlock contacts on antenna tap switch (553) not closed properly (applies only if using i-f radio transmitter).
7. Defective copper-oxide rectifier (692).

L. M-o stage of h-f radio transmitter does not tune properly.

1. Defective m-o tube (400).

2. Contacts of m-o band-change switch (375) require adjustment or cleaning.
3. M-o tuning capacitor (200) defective due to bent plates or collection of dust and foreign matter between plates.
4. M-o calibration capacitor (203) defective due to bent plates or collection of dust and foreign matter between plates.

M. First i-p-a stage of h-f radio transmitter does not tune properly.

1. Defective first i-p-a tube (401).
2. Contacts of first i-p-a grid band-change switch (376) require adjustment or cleaning.
3. First i-p-a grid band-change switch (376) not in correct position for desired operating frequency.
4. Contacts of first i-p-a plate band-change switch (377) require adjustment or cleaning.
5. First i-p-a plate band-change switch (377) not in correct position for desired operating frequency.
6. First i-p-a tuning capacitor (217) defective due to bent plates or collection of dust and foreign matter between plates.
7. Defective m-o plate ammeter (340).
8. Defective first i-p-a plate ammeter (341).

N. Second i-p-a stage of h-f radio transmitter does not tune properly.

1. Defective sound i-p-a tube (402).
2. Contacts of second i-p-a band-change switch (378) require adjustment or cleaning.
3. Second i-p-a band-change switch (378) not in correct position for desired operating frequency.
4. Second i-p-a tuning inductor (304) defective due to accumulation of dust and foreign matter at moving contact points. Clean with carbon tetrachloride, or equivalent.
5. Defective second i-p-a plate ammeter (342).

O. P-a stage of h-f radio transmitter does not tune properly.

1. Defective p-a tube(s) (403).
2. Contacts of p-a band-change switch (380) require adjustment or cleaning.
3. P-a band-change switch (380) not in correct position for desired operating frequency.
4. P-a tuning inductor (306) defective due to accumulation of dust and foreign matter at moving contact points. Clean with carbon tetrachloride or equivalent.
5. Defective p-a grid ammeter (345).
6. Defective p-a plate ammeter (343).

P. Antenna stage of h-f radio transmitter does not tune properly.

1. Output inductor (307) defective due to accumulation of dust and foreign matter at moving contact points. Clean with carbon tetrachloride or equivalent.
2. Output capacitor (237) defective due to bent plates or collection of dust and foreign matter between plates.
3. Antenna inductor (308) defective. Cause and remedy same as P-2 above.
4. Antenna capacitor (238) defective. Cause and remedy same as P-3 above.
5. Antenna contacts of keying relay (387) not functioning properly. Service as described under Section "XVI. MAINTENANCE."
6. Antenna system open-circuited, short-circuited, or grounded.
7. Antenna ammeter (346) defective.

Q. H-f radio transmitter fails to modulate properly on MCW or Phone.

1. Modulator tube (404) defective.
2. Contacts of emission switch (381) require adjustment or cleaning.
3. Microphone jack (426) defective or requires adjustment or cleaning.
4. Carrier control (276) incorrectly set, or moving contact defective, requiring adjustment or cleaning.
5. Audio gain control (280) incorrectly set, or moving contact defective, requiring adjustment or cleaning.
6. Modulation indicator meter (348) defective.
7. Modulator plate ammeter (344) defective.

R. M-o stage of i-f radio transmitter does not tune properly.

1. M-o tube (545) defective.
2. Contacts of m-o band-change switch (548) require adjustment or cleaning.
3. M-o tuning capacitor (450) defective due to bent plates or collection of dust and foreign matter between plates.
4. M-o calibration capacitor (453) defective. Cause and remedy same as R-2 above.

S. I-p-a stage of i-f radio transmitter does not tune properly.

1. I-p-a tube (546) defective.
2. Contacts of i-p-a grid band-change switch (549) require adjustment or cleaning.
3. I-p-a grid band-change switch (549) not in correct position for desired operating frequency.
4. I-p-a grid tuning capacitor (460) defective. Cause and remedy same as R-3 on this page.
5. Contacts of i-p-a plate band-change switch (550) require adjustment or cleaning.
6. I-p-a plate band-change switch (550) not in correct position for desired operating frequency.
7. I-p-a plate tuning capacitor (468) defective. Cause and remedy same as R-3 on Page 20.
8. I-p-a grid ammeter (568) defective.
9. I-p-a plate ammeter (569) defective.

T. P-a stage of i-f radio transmitter does not tune properly.

1. P-a tube(s) (547) defective.
2. Contacts of p-a band-change switch (551) require adjustment or cleaning.
3. P-a band-change switch (551) not in correct position for desired operating frequency.
4. P-a tuning capacitor (495) defective. Cause and remedy same as R-3 on Page 20.
5. P-a grid ammeter (570) defective.
6. P-a plate ammeter (571) defective

U. Antenna stage of i-f radio transmitter does not tune properly.

1. Antenna coupling switch (552) not in correct position for operating frequency and antenna characteristics.
2. Contacts of antenna coupling switch (552) require adjustment or cleaning.
3. Antenna band-change switch (553) not in correct position for operating frequency and antenna characteristics.
4. Contacts of antenna band-change switch (553) require adjustment or cleaning.
5. Antenna series capacitor (494) defective. Cause and remedy same as R-3 on Page 20.
6. Antenna contacts of keying relay (577) not functioning properly. Service as described under Section "XVI. MAINTENANCE."
7. Antenna system open-circuited, short-circuited, or grounded.
8. Antenna ammeter (574) defective.

V. I-f radio transmitter fails to modulate properly on MCW.

1. Modulator tube (544) defective.
2. Contacts of emission switch (554) require adjustment or cleaning.
3. Modulator plate ammeter (489) defective.

XVIII. REPLACEMENT MATERIAL

In order to facilitate identification of the parts of the equipment, each part has been assigned a symbol number or part designation (201, 202, 406, etc.). These symbol numbers appear on schematic and internal connection diagrams and in the parts list included with this book. The parts list also shows the Navy type number for the various parts to which type numbers have been assigned. In ordering a renewal part, it should be identified by name, Navy type number, and manufacturer's designation and rating. If a Navy type number has not been assigned, the part should be identified by its name, manufacturer's designation and rating, symbol, and by reference to the model designation of the equipment in which it is used.

TABLE I

LIST OF MAJOR UNITS

MODEL TCM-2	MODEL TCU-2	NAVY TYPE DESIGNATION	NAME	SYMBOL DESIGNATION GROUP
X	-	CG-52206	H-f Radio Transmitter Unit	200 to 449
-	X	CG-52205	I-f Radio Transmitter Unit	450 to 594
X	X	CG-20122	Rectifier Power Unit	600 to 749
X	X	-	Cables	1300 to 1350
X	X	CG-23241	Control Unit	1750 to 1799
X	-	CMX-51004C	Hand Microphone	-

Contract NXss - 15910 Dated 1 June 1943

TABLE II
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS						
*200	-	M-o Tuning Capacitor	Variable: 360 mu mu f max ±1%, 14.5 mu mu f min, Isolantite insulation	-	-	-	12	-	T-7660312-G1
*201	-	M-o Grid Fixed Capacitor	Ceramic: 100 mu mu f ±1%, -0.0003 mu mu f/mu mu f/deg C, 500 volts d-c working	481475-0003N1	-	-	8	Class E	K-7892035-P1
*202	-	M-o Padding Capacitor	Mica: 290 mu mu f ±1.0%, 500 volts d-c working, (molded silver cap)	481474-E1	-	-	16	-	M-7465676-P22
203	-	M-o Calibration Capacitor	Air: 4 mu mu f, min; 15 mu mu f, max	-	-	-	484	-	M-7462719-G2
*204	-	M-o Cathode By-Pass Capacitor	Mica: 0.01 mu f ±10%, 600 volts d-c working	48027-B10	RE 48AA 112N	A	329	A2LS-1110	P-7761560-P1
*205	-	M-o Grid Blocking Capacitor	Mica: 0.0005 mu f ±10%, 600 volts d-c working	48011-B10	RE 48AA 112N	A	329	A2LS-1350	P-7761560-P2
*206	-	M-o Screen Blocking Capacitor	Same as 204	48027-B10	-	-	-		-
*207	-	1st I-p-a Tank Capacitor	Mica: 0.00005 mu f ±5%, 2000 volts d-c working	48038-B5	RE 48AA 112N	A	329	A2LS-5450	P-7761560-P10
*208	-	M-o Plate Blocking Capacitor	Mica: 0.01 mu f ±10%, 1200 volts d-c working	48035-B10	RE 48AA 112N	A	329	A2LS-2110	P-7761560-P3
*209	-	1st I-p-a Grid Coupling Capacitor	Mica: 0.00005 mu f ±5%, 1200 volts d-c working	48910-B5	RE 48AA 112N	A	329	A2LS-2450	P-7761560-P4
*210	-	1st I-p-a Grid Leak By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*211	-	M-o Plate Meter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*212	-	1st I-p-a Cathode By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*213	-	1st I-p-a Screen By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*214	-	1st I-p-a Suppressor By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*215	-	1st I-p-a Plate Blocking Capacitor	Same as 208	48035-B10	-	-	-	-	-
*216	-	1st I-p-a Plate Meter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-

△ Symbol part designation, if any.
ππ Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFG. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS (CONT'D)						
217	-	1st I-p-a Tank Tuning Capacitor	Variable: 400-420 mu mu f max, 15-20 mu mu f min, Mycalex insulation	-	-	-	322	Type XR-375-PS	M-7462676-P1
*218	-	2nd I-p-a Grid Leak By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*219	-	2nd I-p-a Cathode By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*220	-	2nd I-p-a Screen By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*221	-	2nd I-p-a Suppressor By-pass Capacitor	Mica: 0.002 mu f ±10%, 1200 volts d-c working	48913-B10	RE 48AA 112N	A	329	A2LS-2220	P-7761560-P11
*222	-	2nd I-p-a Grid Coupling Capacitor	Mica: 0.00006 mu f ±10%, 1200 volts d-c working	48911-B10	RE 48AA 112N	A	329	A2LS-2460	P-7761560-P12
*223	-	2nd I-p-a Plate Blocking Capacitor	Same as 208	48035-B10	-	-	-	-	-
*224	-	2nd I-p-a Pield Tank Capacitor	Mica: 0.0003 mu f ±5%, 5000 volts test	48426-C5	RE 48AA 131C	I	329	F2LST-533	P-7761566-P16
*225	-	P-a Grid Coupling Capacitor	Same as 207	48038-B5	-	-	-	-	-
*226	-	2nd I-p-a Plate Meter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*227	-	P-a Grid Leak By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*228	-	M-o Cathode By-pass Capacitor	Mica: 0.006 mu f ±10%, 300 volts d-c working	48847-B10	RE 13A 389K	-	7	Cat. No. 1WLS	P-7762455-P27
*229	-	Filament Voltmeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*230	-	P-a Grid Meter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*231	-	P-a Suppressor By-pass Capacitor	Mica: 0.005 mu f ±10%, 1200 volts d-c working	48409-B10	RE 48AA 112N	A	329	A2LS-2250	P-7761560-P9
*232	-	P-a Screen By-pass Capacitor	Same as 231	48409-B10	-	-	-	-	-
*233	-	P-a Filament By-pass Capacitor	Same as 231	48409-B10	-	-	-	-	-
*234	-	P-a Filament By-pass Capacitor	Same as 231	48409-B10	-	-	-	-	-
*235	-	P-a Plate Blocking Capacitor	Mica: 0.005 mu f ±5%, 5000 volts test	48915-B5	RE 48AA 122E	-	329	G2-5250	M-7462694-P1

△ Symbol part designation, if any.
ππ Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS (CONT'D)						
*236	-	Output Circuit Blocking Capacitor	Mica: 0.001 mu f ±5%, 5000 volts test	48337-C5	RE 48AA 131C	1	329	F2LST-521	P-7761566-P18
237	-	Output Circuit Impedance Matching Capacitor	Variable: 330 mu mu f max, 41 mu mu f min, Mycalex Insulation	-	-	-	322	XP-330KS	M-7462676-P4
238	-	Antenna Tuning Capacitor	Variable: 110 mu mu f max, 31 mu mu f min	-	-	-	322	XG-110KS	M-7462676-P3
*239	-	P-a Fixed Tank Capacitor	Mica: 0.0003 mu f ±5%, 10,000 volts test	48380-5	RE 48AA 122E	-	329	G2-1023	M-7462694-P3
*240	-	P-a Plate Milliammeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*241	-	Modulation Inductor By-pass Capacitor	Same as 205	48011-B10	-	-	-	-	-
*242	-	Modulator Plate Meter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*243	-	Modulator-oscillator Plate By-pass Capacitor	Paper, Pyranol askarel-filled, 2 mu f, 600 volts, d-c working	48883	RE 13A 488C	-	10	Model # 9CE5A93	-
244	-	Not Used	-	-	-	-	-	-	-
*245	-	Modulator Grid By-pass Capacitor	Paper, Pyranol askarel-filled, 2 mu f -2.5%, +10%, 400 volts d-c working	48403	RE 13A 488C	-	7	Cat. No. VC-278	M-7462695-P1
*246	-	A-f Oscillator Tank Capacitor	Paper, Pyranol askarel-filled, 0.15 mu f , 405 volts a-c, 1000 cycles	48916	RE 13A 488C	-	10		M-5213288-G1
*247	-	A-f Oscillator Grid Capacitor	Same as 204	48027-B10	-	-	-	-	-
*248	-	Microphone Filter Capacitor (2 used)	Paper, Pyranol askarel-filled, 10 mu f, 600 volts d-c working	48721	RE 13A 488C	-	10	Model # 9CE5A87	M-7464792-P4
*249	-	P-a Suppressor Voltage By-pass Capacitor	Same as 243	48883	-	-	-	-	-
*250	-	Screen Grid By-pass Capacitor	Same as 245	48403	-	-	-	-	-
*251	-	Microphone Filter Capacitor	Same as 248	48721	-	-	-	-	-

△Symbol part designation, if any.
⊤⊤Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS (CONT'D)						
252	-	Not Used	-	-	-	-	-	-	-
*253	-	MCW Plate Voltage Blocking Capacitor	Same as 208	48035-B10	-	-	-	-	-
*254	-	Bias Filter Capacitor	Same as 248	48721	-	-	-	-	-
*255	-	Keying Surge Capacitor	Paper, Pyranol askarel-filled, 0.25 mu f, 1000 volts d-c working	48802	RE 13A 488C	-	10	Model # 9CE6A15	P-7763475-P11
256 to 264 Incl	-	Not Used	-	-	-	-	-	-	-
			RESISTORS						
*256	-	M-o Grid Leak Resistor	Metallized: 50,000 ohms ±10%, 2 watts	63474	RE 13A 372G	-	28	Type BT-2	P-7761577-P24
266	-	Not Used	-	-	-	-	-	-	-
*267	-	M-o Plate Dropping Resistor	Wire wound: 5000 ohms ±5%, 20 watts	63645	RE 13A 372J	-	28	Type EP	P-7761577-P22
*268	-	1st I-p-a Grid Leak Resistor	Wire wound: 30,000 ohms ±5%, 12 watts	63641	RE 13A 372J	-	28	Type DJ	P-7761577-P9
269	-	Not Used	-	-	-	-	-	-	-
270	-	Not Used	-	-	-	-	-	-	-
*271	-	2nd I-p-a Grid Leak Resistor	Same as 268	63641	-	-	-	-	-
272	-	Not Used	-	-	-	-	-	-	-
273	-	Not Used	-	-	-	-	-	-	-
274	-	Not Used	-	-	-	-	-	-	-
275	-	Not Used	-	-	-	-	-	-	-
*276	-	P-a Grid Leak Resistor	Variable: 3500 ohms, 50 watts, 119 ma max	-	-	-	165	Model J	M-7462674-P5
*277	-	P-a Screen Dropping Resistor	Wire wound: 500 ohms ±5%, 20 watts	63644	RE 13A 372J	-	28	Type EP	P-7761577-P14
*278	-	Modulator Load Resistor	Metallized: 5000 ohms ±10%, 1 watt	63288	RE 13A 372G	-	28	Type BT-1	P-7761577-P23
279	-	Not Used	-	-	-	-	-	-	-
*280	-	Modulator Gain Control Potentiometer	Variable: Curve A, 75,000 ohms; Curve B, 13,000 ohms, semi-logarithmic taper	63673	-	-	5	Type C	M-7461827-P1

△ Symbol part designation, if any.
TT Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			RESISTORS (CONT'D)						
*281	-	Modulator Decoupling Resistor	Metallized: 100,000 ohms ±10%, 1 watt	63288	RE 13A 372G	-	28	Type BT-1	P-7761577-P1
*282	-	Modulator Cathode Resistor	Wire wound: 500 ohms ±5%, 2 watts	63637	RE 13A 372J	-	28	Type AA	P-7761577-P21
*283	-	A-f Oscillator Grid Leak Resistor	Metallized: 30,000 ohms ±5%, 1 watt	63291	RE 13A 372G	-	28	Type BT-1	P-7761577-P2
*284	-	Modulator Screen Resistor	Wire wound: 25,000 ohms, tapped at 10,000 ohms, ±10%, 20 watts	63646	RE 13A 372J	-	28	Type EP	P-7761577-P19
285	-	A-f Oscillator Plate Rheostat	Variable: 10,000 ohms, 50 watts, 70 ma max current	-	-	-	165	Model J	M-7462674-P3
*286	-	Modulator Output Transformer Secondary Resistor	Metallized: 50,000 ohms ±10%, 1 watt	63288	RE 13A 372G	-	28	Type BT-1	P-7761577-P3
287	-	Not Used	-	-	-	-	-	-	-
288	-	Filament Transformer Rheostat	Variable: 10 ohms, 50 watts, 2200 ma max current, flat on shaft	-	-	-	165	Model J	M-7462674-P1
*289	-	Bias Filter Resistor	Wire wound: 1500 ohms, ±10%, 2 watts	631491	RE 13A 372J	-	28	Type BT-2	P-7761577-P25
*290	-	Keying Surge Resistor	Metallized: 2200 ohms ±10%, 1 watt	63288	RE 13A 372G	-	28	Type BT-1	P-7762300-P66
291 to 299 Incl	-	Not Used	-	-	-	-	-	-	-
			R-F INDUCTORS AND CHOKE COILS						
300	-	M-o Grid Tank Coil	Coil containing 31 turns of 0.040 in. diam bare copper wire with 6 taps; one at 4 3/4 turns, one at 6 turns, one at 11 1/2 turns, one at 13 turns, one at 21 1/4 turns, one at 26 3/4 turns. Wound on 2 1/2-in. O.D. grooved Isolantite form.	-	-	-	137	-	V46J574

△ Symbol part designation, if any.
⊤⊤ Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
R-F INDUCTORS AND CHOKE COILS (CONT'D)									
301	-	M-o Plate Inductor	Consists of 70 turns of 0.0226 in. diam bare copper wire (0.0256 in. diam D.E.) with 3 taps: one at 30 1/16 turns, one at 40 1/9 turns, and one at 52 1/8 turns. Wound on 1 3/4 in. O.D. grooved Isolantite form.	-	-	-	137	-	P42J256
302	-	1st I-p-a Tank Coil	Consists of 26 turns of 0.064 in diam bare copper wire tinned with two taps: one at 14 turns and one at 20 turns. Wound on 2 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7946469-G1
303	-	2nd I-p-a Tank Coil	Consists of 26 turns of 0.064 in. diam bare copper wire tinned. Wound on 1 1/2 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7946470-G1
304	-	2nd I-p-a Rotating Tank Coil	Variable: Consists of 21 3/4 left-hand turns of 0.064 in. diam silver plated copper wire, wound on 1.976 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7761957-G2
305	-	P-a Fixed Tank Coil	Consists of 12 1/2 turns of 0.080 in. diam silver plated copper wire. Wound on 2 1/2 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7463364-G1
306	-	P-a Rotating Tank Coil	Variable: Consists of 17 1/2 turns of 1/8 in. x 1/4 in. cross section silver plated copper wire. Wound on grooved Mycalex frame.	-	-	-	484	-	T-41J540
307	-	Impedance Matching Inductor	Variable: Consists of 35 3/4 right-hand turns of 0.064 in. diam silver plated copper wire. Wound on 1.976 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7761957-G1
308	-	Antenna Tuning Indicator	Same as 307	-	-	-	-	-	-

△Symbol part designation, if any.
TT Styles or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			R-F INDUCTORS AND CHOKE COILS (CONT'D)						
309 to 315 Incl	-	Not Used	-	-	-	-	-	-	-
*316	-	M-o Screen Choke Coil	Consists of 300 turns of 0.010 in. diam bare tinned copper wire (0.018 in. diam D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462709-G1
*317	-	M-o Plate Choke Coil	Consists of 200 turns of 0.010 in. diam bare tinned copper wire (0.018 in. diam D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462716-G1
*318	-	1st I-p-a Grid Choke Coil	Same as 317	-	-	-	-	-	-
*319	-	1st I-p-a Plate Choke Coil	Consists of 150 turns of 0.010 in. diam bare tinned copper wire (0.018 in. diam D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462716-G2
*320	-	2nd I-p-a Grid Choke Coil	Same as 319	-	-	-	-	-	-
*321	-	2nd I-p-a Plate Choke Coil	Consists of 75 turns of 0.020 in. diam bare tinned copper wire (0.028 in. diam D.C.C.) Universal wound, 4 crosses per turn on 1/2 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462716-G3
322	-	Not Used	-	-	-	-	-	-	-
*323	-	P-a Grid Choke Coil	Consists of 100 turns of 0.016 in. diam bare tinned copper wire (0.0184 in. diam double enamel). Wound on 1 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462772-G1

△ Symbol part designation, if any.
TT Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			R-F INDUCTORS AND CHOKE COILS (CONT'D)						
*324	-	P-a Plate Choke Coil	Same as 321	-	-	-	-	-	-
325	-	Not Used	-	-	-	-	-	-	-
*326	-	M-o Cathode Choke Coil	Same as 319	-	-	-	-	-	-
*327	-	P-a Suppressor Grid Choke Coil	Same as 319	-	-	-	-	-	-
*328	-	P-a Screen Grid Choke Coil	Same as 319	-	-	-	-	-	-
329 to 334 Incl	-	Not Used	-	-	-	-	-	-	-
			REACTORS						
335	-	Microphone Filter Reactor	2 henries, 0.125 amp d-c, 40 ohms max d-c, 0.100 kv insulation	30413	-	-	138	Cat. No. 66G70	-
336	-	Bias Filter Reactor	20 henries, 0.05 amp d-c, 220 ohms d-c, 0.75 kv insulation	30414	-	-	138	Cat. No. 66G138	-
337 to 339 Incl	-	Not Used	-	-	-	-	-	-	-
			METERS						
*340	-	M-o Plate Milliammeter	Scale 0-50 ma d-c, 2 1/2 in. diam flush, phenolic case, anti-glare glass	22057	17I12a	-	65	Type 8DW-41	P-7761557-P1
*341	-	1st I-p-a Plate Milliammeter	Scale 0-100 ma d-c, 2 1/2 in. diam flush, phenolic case, anti-glare glass	22058	17I12a	-	65	Type 8DW-41	P-7761557-P2
*342	-	2nd I-p-a Plate Milliammeter	Same as 341	22058	-	-	-	-	-
*343	-	P-a Plate Milliammeter	Scale 0-500 ma d-c, 2 1/2 in. diam flush, phenolic case, anti-glare glass	22068	17I12a	-	65	Type 8DW-41	P-7761557-P3

△ Symbol part designation, if any.
⊤⊤ Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			METERS (CONT'D)						
*344	-	Modulator Plate Milliammeter	Same as 340	22057	-	-	-	-	-
*345	-	P-a Grid Milliammeter	Same as 341	22058	-	-	-	-	-
*346	-	Antenna Ammeter	Scale 0-5 amp, r-f, 2 1/2 in. diam flush, phenolic case, anti-glare glass, internal thermocouple	22026	17I12a	-	65	Type 8DW-44	P-7761557-P4
*347	-	Filament Voltmeter	Scale 0-10 volts, 2-c with red mark on scale at 6.3 volts, 2 1/2 in. diam flush phenolic case, anti-glare glass	22079	17I12a	-	65	Type 8AW-41	P-7761557-P9
*348	-	Modulation Indicator	Scale 0-150 volts a-c, 200-3000 cycles, copper-oxide rectifier type, 2 1/2 in. diam flush, phenolic-case, anti-glare glass	22269	17I12a	-	65	Type 8DW-46	P-7761557-P6
349 to 354 Incl	-	Not Used	-	-	-	-	-	-	-
			TRANSFORMERS						
355	-	Filament Transformer	50/62 cycles, 0.5 kv insulation. Pri: 125 volts/115 volts/105 volts/95 volts Sec.1: 13.24 volts/6.62 volts Sec.2: 13.24 volts/6.62 volts Sec.3: 13.24 volts/6.62 volts Sec.4: 10.5 volts/5.25 volts	30409	-	-	138	Model # 9TD1244E1	-
356	-	Microphone Transformer	200 to 3000 cycles Turn ration N_p/N_{sec} 1/50 N_{ter}/N_{sec} 1/4.07 Pri: 6 ohms, d-c Sec: 2650 ohms, d-c Ter: 250 ohms, d-c	30404	-	-	138	Cat. No. 66G48	-

△ Symbol part designation, if any.
TT Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			TRANSFORMERS (CONT'D)						
357	-	A-f Oscillator Transformer	1000 cycles, ratio 3 to 1, Pri to Sec, Pri 21 ohms d-c Sec: 23 ohms, d-c	30405	-	-	138	Cat. No. 66G49	-
358	-	Modulator Output Transformer	200-3000 cycles Turn Ratio N_p/N_{sec} 2.29/1 N_p/N_{ter} 3.48/1 Pri: 176 ohms d-c Sec: 100 ohms d-c Ter: 5 to 6 - 20 ohms d-c 5 to 7 - 30 ohms d-c 5 to 8 - 41 ohms d-c	30406	-	-	138	Cat. No. 66G50	-
359 to 361 Incl	-	Not Used	-	-	-	-	-	-	-
			ILLUMINATING AND INDICATING LAMPS						
*362	-	Panel Illuminating Lamp	3 candlepower, 6-8 volts, double contact base	-	-	-	66	G-E Mazda No. 64	-
*363	-	Panel Illuminating Lamp	Same as 362	-	-	-	-	-	-
*364	-	Plate Voltage Indicator Lamp	Same as 362	-	-	-	-	-	-
365	-	Plate Voltage Indicator Lamp Assembly	Lamp assembly consisting of:	-	-	-	486	-	ML-7871649-G2
*365	A		Red jewel with bezel ring for Indicating Lamp						K-7871647-P2
365	B		G-E Mazda lamp, 3 candlepower, 6-8 volts, double contact base					G-E Mazda No. 64	
366	-	Panel Illuminating Lamp Assembly	Double contact, end connection with Bakelite insert, mounting bracket, and reflector	-	-	-	137	-	ML-7463388-G1
367	-	Panel Illuminating Lamp Assembly	Same as 366	-	-	-	-	-	-
368 to 374 Incl	-	Not Used	-	-	-	-	-	-	-

△Symbol part designation, if any.
TTStyles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			SWITCHES						
375	-	M-o Grid Band Change Switch	Rotary, 3 bank, 4 position, Isolantite insulation; combined with 376	-	-	-	189	-	ML-7761563-G1
376	-	M-o Plate Band Change Switch	Combined with 375	-	-	-	-	-	-
377	-	1st I-p-a Band Change Switch	Rotary, 1 bank, 3 position, Isolantite insulations	-	-	-	189	-	ML-7760329-G4
378	-	2nd I-p-a Band Change Switch	Rotary, 4 bank, 3 position, with interlock, Isolantite insulation; combined with 380	-	-	-	189	-	ML-7761583-G1
379	-	Not Used	-	-	-	-	-	-	-
380	-	P-a Band Change Switch	Same as 378, combined with 378	-	-	-	189	-	-
381	-	Emission Selector Switch	Rotary, 6 bank, 3 position, Isolantite insulation	-	-	-	189	-	ML-7761661-G1
*382	-	Panel Illuminating Lamp Switch	Toggle, double-pole, single-throw, 1 amp, 250 volts, 3 amp, 125 volts	24001	RE 24AA 118A	-	137	Cat. No. 1GA2A21	-
*383	-	Panel Illuminating Lamp Switch	Same as 382	24001	-	-	-	-	-
384	-	Filament Transformer Primary Tap Switch	Rotary, 1 bank, 4 position, Isolantite insulation	-	-	-	189	-	ML-7761765-G1
*385	-	Rear Access Door Interlock	10 amp, 250 volts	24067	-	-	55	-	ML-7460330-G4
*386	-	Test Key	Toggle, telephone type, single-pole, double-throw, 3 amp, not more than 110 watts. Test voltage 500 volts, a.c., 60 cycles	-	-	-	344	Cat. No. Z-2877	M-7461816-P1
			RELAYS						
†387	-	Keying Relay	1 - Set large contacts single-pole, double-throw, N.C. 1 - Set large contacts single-pole, double-throw, N.O. 1 - Set small contacts single-pole, single-throw, N.O.	-	-	-	487	-	ML-7660603-G1

△Symbol part designation, if any.
πStyles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.
†Spare coils and contacts furnished. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			RELAYS (CONT'D)						
†387	-	Keying Relay	C o n t i n u e d 1 - Set small contacts single-pole, single-throw, N.O. 2 - Coils each 140 ohms ±5 ohms connected in series current 0.20 amp at 25 deg C at 55 volts across coils	-	-	-	487	-	ML-7660603-G1
388 to 399 Incl	-	Not Used	-	-	-	-	-	-	-
*400	-	Master Oscillator Tube	R-f power amplifier and oscillator, pentode type	837	RE 13A 600D	-	485	-	-
*401	-	1st I-p-a Tube	Same as 400	837	-	-	-	-	-
*402	-	2nd I-p-a Tube	Same as 400	837	-	-	-	-	-
*403	-	P-a Tube (2 used)	R-f power amplifier, pentode type	803	RE 13A 600D	-	485	-	-
*404	-	Modulator Tube	Same as 400	837	-	-	-	-	-
405 to 409 Incl	-	Not Used	-	-	-	-	-	-	-
			VACUUM TUBE SOCKETS						
410	-	M-o Tube Socket	Medium, 7 prong, with cadmium plated contacts and Isolantite insulation	49317	RE 13A 524A	-	358	-	K-7873980
411	-	1st I-p-a Tube Socket	Same as 410	49317	-	-	-	-	-
412	-	2nd I-p-a Tube Socket	Same as 410	49317	-	-	-	-	-
413	--	P-a Tube Socket (2 used)	Giant, 5 prong, with nickel-plated contacts and ceramic insulation	-	-	-	358	Type 216	M-7463389-P1
414	-	Modulator Tube Socket	Same as 410	49317	-	-	-	-	-
415	-	Not Used	-	-	-	-	-	-	-
			PLUGS						
416	-	A-c Power Plug (2 used)	9-pin, 8-contact plug. Included with cable 1306. Used with receptacle 428	-	-	-	488	-	ML-7761589-G1

△Symbol part designation, if any.
⊤⊤Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.
†Spare coils and contacts furnished. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			PLUGS (CONT'D)						
417	-	D-c Power Plug (2 used)	9-pin, 8-contact plug. Included with cable 1307. Used with receptacle 429	-	-	-	488	-	ML-7761589-G2
418	-	H-v Plate Supply Plug (2 used)	Single-contact plug. Included with cable 1308. Used with receptacle 430	-	-	-	488	-	ML-7761591-G1
419	-	L-v Plate Supply Plug (2 used)	Single-contact plug. Included with cable 1309. Used with receptacle 431	-	-	-	488	-	ML-7761589-G7
420 to 424 Incl	-	Not Used	-	-	-	-	-	-	-
			JACKS AND RECEPTACLES						
425	-	Input Line Jack	One spring, open circuit, midget type	49025A	-	-	19	-	M-7463112-G1
426	-	Microphone Jack	Three circuit, 2 spring, open, midget type	49039	-	-	19	-	ML-7463113-G1
427	-	Key Jack	Same as 425	49025A	-	-	-	-	-
428	-	A-c Power Receptacle	9-pin, 8-contact, marked 20 to 27 incl.	-	-	-	55	-	ML-7761590-G1
429	-	D-c Power Receptacle	9-pin, 8-contact, marked 28 to 35 incl.	-	-	-	55	-	ML-7761590-G2
430	-	H-v Plate Supply Receptacle	1 contact with Isolantite base, marked 52	-	-	-	55	-	ML-7761590-G7
431	-	L-v Plate Supply Receptacle	1 contact with Isolantite base, marked 53	-	-	-	55	-	ML-7761592-G1
			BINDING POSTS						
432	-	Counterpoise Terminal	Nickel-plated with No. 8-32 tapped hole in base	-	-	-	137	-	ML-7871785-G1
433	-	Antenna Terminal	"Sergeant" nickel-plated No. 8-32 tapped base, omit stud	-	-	-	137	-	M48J308-P1
434	-	Receiver Terminal	Same as 432	-	-	-	-	-	-

△ Symbol part desigation, if any.
TT Style or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
H-F RADIO TRANSMITTER NAVY TYPE CG-52206

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			BINDING POSTS (CONT'D)						
435	-	Ground Terminal	Nickel-plated with 1/4 in.-20 tapped hole in base	-	-	-	137	-	ML-7871786-G1
436 to 449 Incl	-	Not Used	-	-	-	-	-	-	-

△ Symbol part designation, if any.
⊤⊤ Style or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS						
450	-	M-o Variable Tank Capacitor	Variable: 475-490 mu mu f max, 15-20 mu mu f min, Mycalex insulation	-	-	-	322	-	M-7462676-P8
*451	-	M-o Grid Tank Capacitor	Mica: 0.0011 mu f/0.0027 mu f ±2%, 1000 volts d-c test, combined with 452	48914-D2	RE 48AA 131C	-	7		M-7462693-P2
*452	-	M-o Screen Grid Tank Capacitor	Combined with 451	-	-	-	-	-	-
453	-	M-o Tube Compensating Capacitor	Variable: 4 mu mu f min, 15 mu mu f max	-	-	-	484	-	ML-7462719-G1
*454	-	M-o Grid Capacitor	Same as 205	48011-B10	-	-	-	-	-
*455	-	M-o Screen Grid Blocking Capacitor	Same as 204	48027-B10	-	-	-	-	-
*456	-	M-o Screen Grid Choke By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*457	-	M-o Plate Choke By-pass Capacitor	Same as 208	48035-B10	-	-	-	-	-
*458	-	M-o Plate Coupling Capacitor	Mica: 0.0005 mu f ±10%, 1200 volts d-c working	48912-B10	RE 48AA 112N	-	329	A2LS-2350	P-7761560-P5
*459	-	M-o Cathode By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
460	-	I-p-a Grid Tuning Capacitor	Variable: 420-440 mu mu f max, 16-22 mu mu f min, Mycalex insulation	-	-	-	322	-	M-7462676-P5
*461	-	I-p-a Grid Tank Capacitor	Mica: 0.0002 mu f ±5%, 5000 volts d-c test	48366-C5	RE 48AA 131C	I	329	P2LST-532	P-7761566-P17
462	-	Not Used	-	-	-	-	-	-	-
*463	-	Grid Return By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*464	-	I-p-a Self-biasing Resistor By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*465	-	I-p-a Screen Grid By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
466	-	Not Used	-	-	-	-	-	-	-
*467	-	I-p-a Plate By-pass Capacitor	Same as 208	48035-B10	-	-	-	-	-
468	-	I-p-a Plate Tank Tuning Capacitor	Same as 460	-	-	-	-	-	-

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS (CONT'D)						
*469	-	I-p-a Plate Tank Capacitor	Same as 461	48366-C5	-	-	-	-	-
*470	-	P-a Grid Coupling Capacitor	Same as 458	48912-B10	-	-	-	-	-
*471	-	P-a Grid Leak By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*472	-	P-a Suppressor By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*473	-	P-a Screen By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*474	A	P-a Filament By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*474	B	P-a Filament By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*475	-	P-a Plate By-pass Capacitor	Mica: 0.01 mu f ±10%, 2500 volts d-c working	48382-B10	RE 48AA 112N	A	329	A2LS-5110	P-7761560-P7
*476	-	P-a Tank Capacitor	Mica: 0.000185 mu f ±5%, 5000 volts test	48951-C5	RE 48AA 131C	I	329		P-7761566-P15
477 to 483 Incl	-	Not Used	-	-	-	-	-	-	-
*484	-	I-p-a Grid Ammeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*485	-	I-p-a Plate Ammeter Capacitor	Same as 204	48027-B10	-	-	-	-	-
*486	-	P-a Grid Ammeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*487	-	Filament Voltmeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*488	-	P-a Plate Ammeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*489	-	Audio Oscillator Plate Ammeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*490	-	Audio Oscillator Plate Tank Capacitor	Same as 246	48916	-	-	-	-	-
*491	-	Audio Oscillator Plate By-pass Capacitor	Paper, Pyranol askarel-filled: 1 mu f, 600 volts d-c	48719	RE 13A 488C	-	10	Model # 9CE5A90	None

△ Symbol part designation, if any.
TT Styles or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS (CONT'D)						
*492	-	Audio Oscillator Grid Blocking Capacitor	Same as 255	48802	-	-	-	-	-
*493	-	Audio Oscillator Screen Grid By-pass Capacitor	Same as 208	48035-B10	-	-	-	-	-
494	-	Antenna Series Capacitor	Variable: 175-200 mu mu f max in each section, min capacity not greater than 36 mu mu f each section	-	-	-	322	Type XE-180-KD	M-7462677-P1
495	-	P-a Tank Capacitor	Variable: 452-460 mu mu f max, 52-56 mu mu f min, Mycalex insulation	-	-	-	322	Type XP-440-KS	M-7462676-P2
496	-	Compensating Capacitor	Capacity 69.0 to 79.0 mu mu f	-	-	-	19	-	K-7873774
*497	-	Keying Surge Capacitor	Same as 255	48802	-	-	-	-	-
			PLUGS						
498	-	A-c Power Plug	Same as 416	-	-	-	-	-	-
499	-	D-c Power Plug	Same as 417	-	-	-	-	-	-
500	-	H-v Plate Supply Plug	Same as 418	-	-	-	-	-	-
501	-	L-v Plate Supply Plug	Same as 419	-	-	-	-	-	-
502	-	Not Used	-	-	-	-	-	-	-
503	-	Not Used	-	-	-	-	-	-	-
			RESISTORS						
*504	-	M-o Grid Leak Resistor	Same as 265	63474	-	-	-	-	-
*505	-	M-o Plate Dropping Resistor	Same as 289	63640	-	-	-	-	-
*506	-	I-p-a Grid Leak Resistor	Same as 268	63641	-	-	-	-	-
*507	-	I-p-a Grid Tank Resistor	Same as 268	63641	-	-	-	-	-
*508	-	I-p-a Self-biasing Resistor	Wire wound: 800 ohms ±5%, 2 watts	63638	RE 13A 372J	-	28	Type AA	P-7761577-P5

△ Symbol part designation, if any.
⊤⊤ Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			RESISTORS (CONT'D)						
*509	-	P-a Self-biasing Resistor	Wire wound: 40 ohms ±10%, 20 watts	63642	RE 13A 372J	-	28	Type EP	P-7761577-P13
*510	-	MCW P-a Self-biasing Resistor	Wire wound: 80 ohms ±5%, 20 watts	63643	RE 13A 372J	-	28	Type EP	P-7761577-P12
511	-	P-a Grid Leak Resistor	Variable: 1500 ohms, 50 watts, 180 ma max current, screwdriver slot in shaft	-	-	-	165	Model J	M-7462674-P4
*512	-	Audio Oscillator Plate Voltage Dropping Resistor	Wire wound: 2000 ohms ±5%, 2 watts	63639	RE 13A 372J	-	28	Type AA	P-7761577-P7
*513	-	Audio Oscillator Grid Leak Resistor	Same as 268	63641	-	-	-	-	-
*514	-	Audio Oscillator Screen Grid Voltage Dropping Resistor (2 used)	Same as 268	63641	-	-	-	-	-
515	-	Filament Rheostat	Same as 288	-	-	-	-	-	-
*516	-	P-a Screen Grid Voltage Resistor	Same as 277	63644	-	-	-	-	-
*517	-	Keying Surge Resistor	Same as 290	63288	-	-	-	-	-
			R-F INDUCTORS AND CHOKE COILS						
518	-	Not Used	-	-	-	-	-	-	-
519	-	Not Used	-	-	-	-	-	-	-
520	-	Antenna Coupling Coil	Consists of 8 turns of Litz wire Spec. SI-8718D, 128/0.005 in. 0.096 in. diam with 2 taps, one at 3 turns and one at 5 turns. Wound on 2 1/2 in. O.D. phenolic compound tube.	-	-	-	137	-	ML-7462835-G1
521	-	Antenna Coupling Coil	Consists of 12 turns of 0.080 in. diam bare tinned copper wire with 2 taps, one at 4 turns, and one at 8 turns. Wound on 2 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7462824-G1

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			R-F INDUCTORS AND CHOKE COILS (CONT'D)						
522	-	M-o Tank Inductor	Consists of 170 turns of 0.022 in. diam bare copper wire (0.025 in. diam double enamel) with 5 taps: one at 55 turns, one at 68 turns, one at 85 turns, one at 106 turns, and one at 135 turns. Wound on 3 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7462714-G1
523	-	I-p-a Grid Tank Inductor	Consists of 64.5 turns of 0.032 in. diam bare copper wire (0.036 in. diam double enamel) with one tap at 38.5 turns. Wound on 2 1/2 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7462722-G1
524	-	I-p-a Plate I-f Tank Inductor	Consists of 94 turns of Litz wire Spec. SI-8718-3A 20/0.005 in. 0.035 in. diam. with one tap at 46 turns. Wound on 2½ O.D. grooved Isolantite form.	-	-	-	137	-	ML-7462745-G1
525	-	P-a I-f Tank Inductor	Consists of 81 turns of Litz wire Spec. SI-8718H, 32/ 0.005 in., 0.045 in. diam with 2 taps, one at 22 turns and one at 45 turns. Wound on 3 1/2 in. O.D. grooved ceramic form.	-	-	-	137	-	ML-7462779-G1
526	-	P-a H-f Tank Inductor	Consists of 40 turns of 0.064 in. diam bare tinned copper wire with 2 taps, one at 15 turns and one at 24 turns. Wound on 3 in. O.D. grooved Isolantite form.	-	-	-	137	-	M-7462765-G1
527	-	Antenna Variometer	-	-	-	-	19	-	ML-7660364-G1
528	-	I-p-a Plate H-f Tank Inductor	Consists of 64.5 turns of 0.032 in. diam. bare copper wire (0.036 in. diam double enamel) with 2 tpas, one at 32.5 turns and one at 39.5 turns. Wound on 2 1/2 in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7462751-G1

△ Symbol part designation, if any.
ππ Style or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
R-F INDUCTORS AND CHOKE COILS (CONT'D)									
529	-	I-p-a I-f Grid Tank Inductor	Consists of 109 turns of Litz wire Spec. SI-8718-3J, 20/0.005 in., 0.035 in. diam with one tap at 49 turns. Wound on 2 1/2-in. O.D. grooved Isolantite form.	-	-	-	137	-	ML-7461821-G1
530	-	Antenna Loading Coil	Consists of 88 turns of Litz wire Spec. SI-8718E, 64/0.005 in., 0.080 in. diam with 8 taps, tap No. 1 at 18 turns, tap No. 2 at 29 1/4 turns, tap No. 3 at 40 1/4 turns, tap No. 4 at 49 1/4 turns, tap No. 5 at 58 1/4 turns, tap No. 6 at 67 turns, tap No. 7 at 74 turns, tap No. 8 at 82 turns. Left-hand wound single layer, 12 turns per inch. Wound on 6 in. O.D. phenolic compound form.	-	-	-	137	-	ML-7761963-G1
*531	-	M-o Screen Grid Choke Coil	Consists of 900 turns of 0.010 in. bare copper wire (0.018 in. D.C.C.) Universal wound, 2 crosses per turn, on 1/2 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462717-G1
*532	-	M-o Plate Choke Coil	Same as 531	-	-	-	-	-	-
533	-	Not Used	-	-	-	-	-	-	-
*534	-	I-p-a Plate Choke Coil	Same as 317	-	-	-	-	-	-
*535	-	P-a H-f Grid Choke Coil	Same as 317	-	-	-	-	-	-
*536	-	P-a I-f Grid Choke Coil	Consists of 575 turns of 0.010 in. diam bare copper wire (0.018 in. D.C.C.) Universal wound, 2 crosses per turn on 1/2-in. O.D. Isolantite form.	-	-	-	137	-	ML-7462718-G1
*537	-	P-a Plate Choke Coil	Consists of two coils, each having 235 turns of 0.0159 in diam bare copper wire	-	-	-	137	-	ML-7462712-G1

△ Symbol part designation, if any.
ππ Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			R-F INDUCTORS AND CHOKE COILS (CONT'D)						
*537	-	P-a Plate Choke Coil	C o n t i n u e d (0.0239 in. D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form.	-	-	-	137	-	ML-7462712-G1
538	-	Not Used	-	-	-	-	-	-	-
539	-	Not Used	-	-	-	-	-	-	-
			VACUUM TUBE SOCKETS						
540	-	Audio Oscillator Tube Socket	Same as 410	49317	-	-	-	-	-
541	-	M-o Tube Socket	Same as 410	49317	-	-	-	-	-
542	-	I-p-a Tube Socket	Same as 410	49317	-	-	-	-	-
543	-	P-a Tube Socket (2 used)	Same as 413	-	-	-	-	-	-
			VACUUM TUBES						
*544	-	Audio Oscillator Tube	Same as 400	837	-	-	-	-	-
*545	-	M-o Tube	Same as 400	837	-	-	-	-	-
*546	-	I-p-a Tube	Same as 400	837	-	-	-	-	-
*547	-	P-a Tube (2 used)	Same as 403	803	-	-	-	-	-
			SWITCHES						
548	-	M-o Tank Inductor Switch	Rotary, 1 bank, 6 position, Isolantite insulation	-	-	-	189	-	ML-7660329-G2
549	-	I-p-a Grid Tank Inductor Switch	Rotary, 1 bank, 4 position, Isolantite insulation	-	-	-	189	-	ML-7660329-G3
550	-	I-p-a Plate Band Change Switch	Rotary, 3 bank, 5 position, with Isolantite insulation	-	-	-	189	-	ML-7660313-G2
551	-	P-a Tank Inductor Switch	Rotary, 1 bank, 6 position, with interlock and Isolantite insulation	-	-	-	189	-	ML-7660346-G1
552	-	Antenna Coupling Switch	Same as 551	-	-	-	-	-	-
553	-	Antenna Loading Coil Tap Switch	Rotary, 2 bank, 13 position, with interlock and Isolantite insulation	-	-	-	19	-	ML-7761572-G1

△ Symbol part designation, if any.
⊤⊤ Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	π	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			SWITCHES (CONT'D)						
554	-	CW-MCW Switch	Rotary, 2 bank, 2 position, with Isolantite insulation	-	-	-	189	-	ML-7660313-G4
555	-	Filament Switch	Same as 384	-	-	-	-	-	-
*556	-	Panel Illuminating Lamp Switch	Same as 382	24001	-	-	-	-	-
*557	-	Panel Illuminating Lamp Switch	Same as 382	24001	-	-	-	-	-
*558	-	Test Key	Same as 386	-	-	-	-	-	-
*559	-	Door Interlock	Same as 385	24067	-	-	-	-	-
560	-	Not Used	-	-	-	-	-	-	-
561	-	Not Used	-	-	-	-	-	-	-
			ILLUMINATING AND INDICATING LAMPS						
562	-	Panel Illuminating Lamp Assembly	Same as 366	-	-	-	-	-	-
563	-	Panel Illuminating Lamp Assembly	Same as 366	-	-	-	-	-	-
564	-	Plate Voltage Indicator Lamp Assembly	Same as 365	-	-	-	-	-	-
*564	A		Same as 365A						
564	B		Same as 365B						
*565	-	Plate Voltage Indicator Lamp	Same as 362	-	-	-	-	-	-
*566	-	Panel Illuminating Lamp	Same as 362	-	-	-	-	-	-
*567	-	Panel Illuminating Lamp	Same as 362	-	-	-	-	-	-
			METERS						
*568	-	I-p-a Grid Milliammeter	Scale 0-10 ma, d-c, 2 1/2 in. diam flush, phenolic case, anti-glare glass	22053	17I12a	-	65	Type 8DW-41	P-7761557-P12
*569	-	I-p-a Plate Milliammeter	Same as 341	22058	-	-	-	-	-
*570	-	P-a Grid Milliammeter	Same as 341	22058	-	-	-	-	-

△ Symbol part designation, if any.
π Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
I-F RADIO TRANSMITTER NAVY TYPE CC-52205

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	⊤⊤	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			METERS (CONT'D)						
*571	-	P-a Plate Milliammeter	Same as 343	22068	-	-	-	-	-
*572	-	Audio Oscillator Plate Milliammeter	Same as 340	22057	-	-	-	-	-
*573	-	Filament Voltmeter	Same as 347	22079	-	-	-	-	-
*574	-	Antenna Ammeter	Scale 0-8 amp r-f, 2 1/2 in. diam flush, phenolic case, anti-glare glass, internal thermocouple	22268	17I12a	-	65	Type 8DW-44	P-7761557-P8
575	-	Not Used	-	-	-	-	-	-	-
576	-	Not Used	-	-	-	-	-	-	-
			RELAYS						
†577	-	Key Relay	Same as 387	-	-	-	-	-	-
578	-	Not Used	-	-	-	-	-	-	-
579	-	Not Used	-	-	-	-	-	--	-
			TRANSFORMERS						
580	-	Filament Transformer	Same as 355	30409	-	-	-	-	-
581	-	Audio Oscillator Plate Tank Transformer	1000 cycles, ratio Pri/Sec 2.78/1, Pri 1 to 2, 5 ohms, Pri 1 to 3, 18 ohms, Sec 4 to 5, 20 ohms, Sec 4 to 6, 22 ohms	30407	-	-	138	Cat. No. 66G25	K5082688
			BINDING POSTS, JACKS, AND RECEPTACLES						
582	-	Antenna Terminal	Same as 433	-	-	-	-	-	-
583	-	Receiver Terminal	Same as 432	-	-	-	-	-	-
584	-	Counterpoise Terminal	Same as 433	-	-	-	-	-	-
585	-	A-c Power Receptacle	Same as 428	-	-	-	-	-	-
586	-	D-c Power Receptacle	Same as 429	-	-	-	-	-	-
587	-	H-v Plate Supply Receptacle	Same as 430	-	-	-	-	-	-
588	-	L-v Plate Supply Receptacle	Same as 431	-	-	-	-	-	-
589	-	Input Line Jack	Same as 425	-	-	-	-	-	-
590	-	Ground Terminal	Same as 435	-	-	-	-	-	-
591 to 599 Incl	-	Not Used	-	-	-	-	-	-	-

△ Symbol part designation, if any.
⊤⊤ Style or other applicable designation, if any.
*SPARE PARTS FURNSIHED. Refer to Table IV for quantites.
† Spare coils and contacts furnished. Refer to Table IV for quantites

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CAPACITORS						
*600	-	Auxiliary Plate Rectifier Filter Capacitor	Same as 248	48721	-	-	-	-	-
*601	-	Auxiliary Plate Rectifier Filter Capacitor	Same as 248	48721	-	-	-	-	-
*602	-	Main Plate Rectifier Filter Capacitor	Paper; Pyranol askarel-filled, 10 mu f, 1500 volts d-c working	48917	RE 13A 488C	-	10	Model # 9CE5A92	P-7762164-P3
*603	-	Main Plate Rectifier Filter Capacitor	Same as 602	48917	-	-	-	-	-
604	-	Not Used	-	-	-	-	-	-	-
*605	-	Plate Voltmeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*606	-	Filament Voltmeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
*607	-	Line Voltmeter By-pass Capacitor	Same as 204	48027-B10	-	-	-	-	-
608 to 614 Incl	-	Not Used	-	-	-	-	-	-	-
			RESISTORS						
*615	-	Main Plate Rectifier Filter Discharge Resistor	Wire wound: 5000 ohms, Grade 1, Class I, Style B	63149F	RE 13A 372J	-	59	-	M-7464451-P38
*616	-	Main Plate Rectifier Filter Discharge Resistor	Same as 615	63149F	-	-	-	-	-
*617	-	Main Plate Rectifier Filter Discharge Resistor	Same as 615	63149F	-	-	-	-	-
*618	-	Main Plate Rectifier Filter Discharge Resistor	Same as 615	63149F	-	-	-	-	-
619	-	Not Used	-	-	-	-	-	-	-
*620	-	Keying Resistor	Wire wound: 8000 ohms, Grade 1, Class II, Style D	63088E	RE 13A 372J	-	59	-	M-7464052-P40

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			RESISTORS (CONT'D)						
*621	-	Auxiliary Rectifier Potentiometer Resistor	Wire wound: 4500 ohms, Grade 1, Class II, Style B	63148E	RE 13A 372J	-	59	-	P-7762172-P26
*622	-	Auxiliary Rectifier Potentiometer Resistor	Wire wound: 2000 ohms, tapped 10, equal values Grade 1, Class I, Style B	63229	RE 13A 372J	-	165	-	K47J705-P1
*623	-	Auxiliary Rectifier Potentiometer Resistor	Wire wound: 8000 ohms, Grade 1, Class I, Style B	63152F	RE 13A 372J	-	59	-	M-7464451-P40
*624	-	Auxiliary Rectifier Potentiometer Resistor	Wire wound: 3000 ohms, Grade 1, Class II, Style B	63145E	RE 13A 372J	-	59	-	P-7762172-P20
*625	-	Auxiliary Rectifier Screen Grid Potentiometer Resistor	Same as 622	63229	-	-	-	-	-
*626	-	Auxiliary Rectifier Potentiometer Resistor	Same as 622	63229	-	-	-	-	-
*627	-	Auxiliary Rectifier Suppressor Potentiometer Resistor	Same as 622	63229	-	-	-	-	-
*628	-	Microphone Resistor (2 used)	Wire wound: 50 ohms, Grade 1, Class I, Style E	63275F	RE 13A 372J	-	59	-	M-7464454-P18
629	-	Not Used	-	-	-	-	-	-	-
630	-	Filament Rheostat	Wire wound: 18 ohms, 50 watts, 1650 ma max current, flat on shaft	-	RE 13A 372J	-	165	Model J	M-7462674-P2
*631	-	Plate Indicator Lamp Resistor	Wire wound: 4 ohms, Grade 1, Class I, Style E	63559F	RE 13A 372J	-	59	-	M-7464454-P7
632 to 640 Incl	-	Not Used	-	-	-	-	-	-	-
			VACUUM TUBE SOCKETS						
641	-	Main Rectifier Tube Socket (2 used)	For use with tubes having medium, 4-pin bayonet base	49409	-	-	358	Cat. # 209 (modified)	M-7468165-P3

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	π	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			VACUUM TUBE SOCKETS (CONT'D)						
642	-	Auxiliary Rectifier Tube Socket (2 used)	Same as 641	-	-	-	-	-	-
			VACUUM TUBES						
*643	-	Main Rectifier Tube (2 used)	Half-wave, high-vacuum rectifier tube	836	RE 13A 600D	-	69	CNU-836	-
*644	-	Auxiliary Rectifier Tube (2 used)	Same as 643	836	-	-	-	-	-
645	-	Not Used	-	-	-	-	-	-	-
			ILLUMINATING LAMPS						
646	-	Panel Illuminating Lamp Assembly	Same as 366	-	-	-	-	-	-
			SWITCHES						
*647	-	Panel Illuminating Lamp Switch	Same as 382	24001	-	-	-	-	-
648	-	Line Tap Switch	Rotary, 3 bank, 3 position, with Isolantite insulation	-	-	-	189	-	ML-7660313-G3
649	-	Primary Tap Switch	Rotary, 1 bank, 3 position, with Isolantite insulation	-	-	-	189	-	ML-7660154-G4
*650	-	Plate Voltage On-Off Switch	Toggle, double-pole, single-throw, 30 amp, 125 volts	-	-	-	137	Cat. No. 235685	M-7462691-P1
*651	-	Start and Stop Switch	Same as 650	-	-	-	-	-	-
652	-	Voltmeter Switch	Rotary, 1 bank, 2 position, with Isolantite insulation	-	-	-	189	-	ML-7660346-G2
*653	-	Door Interlock	Same as 385	24067	-	-	-	-	-
*654	-	Main Line Switch	Circuit breaker, 2 pole, 20 amp, 115 volts a-c	-	-	-	489	Type AP-1 (modified)	P-7764268-P2
655	-	Gas Engine Start Switch	Push button, momentary contact, single-pole, 1 normally open, 1 normally closed, 2 amp, 125 volts	-	-	-	490	-	M-4324194-G1
656	-	Gas Engine Choke Control Switch	Same as 655	-	-	-	-	-	-

△ Symbol part designation, if any.
π Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			SWITCHES (CONT'D)						
657	-	Gas Engine Stop Switch	Same as 655	-	-	-	-	-	-
			ILLUMINATING AND INDICATING LAMPS						
658	-	Not Used	-	-	-	-	-	-	-
659	-	Not Used	-	-	-	-	-	-	-
*660	-	Plate Voltage Lamp	Same as 362	-	-	-	-	-	-
*660	A		Same as 365A	-	-	-	-	-	-
*661	-	Panel Illuminating Lamp	Same as 362	-	-	-	-	-	-
662 to 664 Incl	-	Not Used	-	-	-	-	-	-	-
			METERS						
*665	-	Filament Voltmeter	Same as 347	22079	-	-	-	-	-
*666	-	Rectifier Output Plate Voltmeter	Scale 0-2 kv d-c, sensitivity of 1000 ohms per volt, 2 1/2 in. diam flush, phenolic case, anti-glare glass, includes 667	22070	17112a	-	65	Type 8DW-41	P-7761557-P10
*667	-	Plate Voltmeter External Multiplier Resistor for 666	1000 ohms per volt, 2 tube cage multiplier, included in 666	-	-	-	-	-	-
*668	-	Line Voltmeter	Scale 0-150 volts a-c, 2 1/2 in. diam flush, phenolic case, anti-glare glass	22085	17I12a	-	65	8AW-41	P-7761557-P11
669 to 671 Incl	-	Not Used	-	-	-	-	-	-	-
			CONTACTORS AND RELAYS						
672	-	Starting Contactor	2 pole, normally open, max continuous rating, 10 amp 600 volts, a-c coil, 115 volts, 60 cycles	-	-	-	490	Cat. No. 4986342EK100	-
673	-	Plate Contactor	Same as 672	-	-	-	-		-

△ Symbol part designation, if any.
ππ Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CONTACTORS AND RELAYS (CONT'D)						
674	-	Plate Time Delay Relay	Time setting 4 to 40 seconds. Contact continuous rating 15 amp, 220 volts, a-c coil, 115 volts, 60 cycles	-	17R6	-	490	Cat. No. 5366956G86	-
675 to 679 Incl	-	Not Used	-	-	-	-	-	-	-
			TRANSFORMERS						
680	-	Main Rectifier Plate Transformer	50/62 cycles, Pri: 0.670 kva, 127/119/111/103 volts Sec: 0.950 kva, 3180/2226/1430 mid. 3.5 kv h-v insulation	30410	-	-	138	Model # 9TD1252E1	-
681	-	Auxiliary Rectifier Plate Transformer	50/62 cycles, Pri: 0.248 kva, 127/119/111/103 volts Sec: 0.350 kva, 1275/637.5 volts 1.5 kv insulation	30411	-	-	138	Model # 9TD1254E1	-
682	-	Copper Oxide Rectifier Transformer	50/62 cycles, Pri: 0.053 kva, 125/115/105/95 volts Sec: 98/90/82/74 volts	30408	-	-	138	Cat. No. 66G139	-
683	-	Filament Transformer	50/62 cycles, 0.057 kva, Pri: 119/111/103/95 volts Sec 1: - 6.3 volts, 0.75 kv insulation Sec 2: - 2.63 volts, 1.5 kv insulation Sec 3: - 2.63 volts, 4.0 kv insulation	30412	-	-	138	Model No. 9TD1256E1	-
684	-	Not Used	-	-	-	-	-	-	-
685	-	Not Used	-	-	-	-	-	-	-

△ Symbol part designation, if any.
ππ Style or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	ππ	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			REACTORS						
686	-	Main Plate Rectifier Reactor	15 henries, 0.42 amp d-c, 91 ohms, d-c resistance, 1.5 kv insulation	30415	-	-	138	Model No. 9XD407E1	-
687	-	Auxiliary Plate Rectifier Reactor	15 henries, 0.45 amp d-c, 68 ohms, d-c resistance, 0.75 kv insulation	30416	-	-	138	Model No. 9XD408E1	-
688 to 691 Incl	-	Not Used	-	-	-	-	-	-	-
			COPPER OXIDE RECTIFIERS						
692	-	Bias and Control Circuit Rectifier (2 used)	Full wave, copper oxide rectifier, input - 98 volts, a-c, output - 55 volts d-c, 0.45 amp d-c (for 2 units)	-	-	-	65	Model No. 6RC3E37V	-
693	-	Not Used	-	-	-	-	-	-	-
			FUSES						
*694	-	Bias Fuse	Cartridge, nonrenewable, 1 amp, 250 volts	-	17F2g	-	137	Cat. No. 59950	-
*695	-	Main Plate Rectifier H-v Fuse	Cartridge, nonrenewable, 0.75 amp, 2000 volts	-	17F2g	-	137	Cat. No. 230074	-
*696	-	Auxiliary Rectifier Plate Fuse	Same as 695	-	-	-	-	-	-
*697	-	Main Plate Auxiliary Plate Rectifier Primary Fuse	Cartridge, renewable, 20 amp, 250 volts	-	17F2g	-	137	Cat. No. 1025	-
*698	-	Rectifier Filament Fuse	Cartridge, renewable, 3 amp, 250 volts	-	17F2g	-	137	Cat. No. 1017	-
*699	-	Filament Transformer Fuse	Same as 698	-	-	-	-	-	-
700 to 704	-	Not Used	-	-	-	-	-	-	-

△ Symbol part designation, if any.
ππ Style or other applicable designation, if any.
*SPARE PARTS FURNSIHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
RECTIFIER NAVY TYPE CG-20122

SYMBOL DESIGNATION	△	FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			RECEPTACLES						
705	-	Screen Grid, Voltage Supply Cable Receptacle	Same as 429	-	-	-	-	-	-
706	-	Filament Voltage Supply Cable Receptacle	Same as 428	-	-	-	-	-	-
707	-	Main Plate Voltage Supply Cable Receptacle	Same as 430	-	-	-	-	-	-
708	-	Auxiliary Plate Voltage Supply Cable Receptacle	Same as 431	-	-	-	-	-	-
709	-	Receiver Power Supply Cable Receptacle	3 contact, marked 17 to 19 inclusive	-	-	-	55	-	ML-7761594-G2
710	-	Alternator and A-c Power Receptacle	8 contact, marked 1 to 8 inclusive	-	-	-	55	-	ML-7761590-G3
711	-	Alternator Control Cable Receptacle	8 contact, marked 9 to 16 inclusive	-	-	-	55	-	ML-7761590-G4
712	-	115 Volts, A-c Outlet Receptacle	Female receptacle	-	-	-	137	-	K47J672-P1
			MISCELLANEOUS						
713	-	Ground Terminal	-	-	-	-	137	-	K47J673-P1
714	-	Terminal Board	6 point, phenolic base	-	-	-	19	-	K-5904041-G1
715 to 719 Incl	-	Not Used	-	-	-	-	-	-	-
			PLUGS						
720 to 723 Incl	-	Not Used	-	-	-	-	-	-	-
724	-	Alternator and A-c Power Plug	8-pin plug. Included with cable 1305	-	-	-	137	-	ML-7660386-G5
725 to 749 Incl	-	Not Used	-	-	-	-	-	-	-

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
CABLES

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
CABLES FOR H-F RADIO TRANSMITTER									
1306	-	Cable for H-f Transmitter	Seven-conductor cable x 7 ft long approx, each conductor shall be No. 16 Awg, 26/0.010-in. stranded tinned copper, wrapped with a closed cotton separator, insulated with 2/64-in. colored 40 per cent rubber, includes plug 416 on end. Colors blue and green.	-	-	-	137	-	ML-7660386-G7
1307	-	Cable for H-f Transmitter	Same as 1306, except includes plug 417 on end. Colors blue and red.	-	-	-	137	-	ML-7660386-G8
1308	-	Cable for H-f Transmitter	Single-conductor cable x 7 ft long approx, No. 14 Awg, 41/0.010-in. stranded tinned copper, wrapped with a closed cotton separator, insulated with 5/64-in. of R-344 40 per cent rubber, includes plug 418 on end. Colors red and white.	-	-	-	137	-	ML-7660386-G12
1309	-	Cable for H-f Transmitter	Same as 1308, except includes plug 419 on end. Colors red and amber.	-	-	-	137	-	ML-7660386-G11
CABLES FOR I-F RADIO TRANSMITTERS									
1306	-	Cable for I-f Transmitter	Seven-conductor cable x 7 ft long approx, each conductor shall be No. 16 Awg, 26/0.010-in. stranded tinned copper, wrapped with a closed cotton separator, insulated with 2/64-in. colored 40 per cent rubber, includes plug 498 on end. Colors blue and green.	-	-	-	137	-	ML-7660386-G7
1307	-	Cable for I-f Transmitter	Same as 1306, except includes plug 499 on end. Colors blue and red.	-	-	-	137	-	ML-7660386-G8

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
CABLES

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			CABLES FOR I-F RADIO TRANSMITTERS (CONT'D)						
1308	-	Cable for I-f Transmitter	Single-conductor cable x 7 ft long approx, No. 14 Awg, 41/0.010-in. stranded tinned copper, wrapped with a closed cotton separator, insulated with 5/64 in. of R-344 40 per cent rubber, includes plug 500 on end. Colors red, and white.	-	-	-	137	-	ML-7660386-G12
1309	-	Cable for I-f Transmitter	Same as 1308, except includes plug 501 on end. Colors red and amber.	-	-	-	137	-	ML-7660386-G11
			CABLE FOR RECTIFIER						
1305	-	Rectifier Cable	Seven-conductor cable x 10 1/2 ft long approx, each conductor shall be No. 16 Awg, 26/0.010-in. stranded tinned copper, wrapped with a closed cotton separator, insulated with 2/64-in. colored 40 per cent rubber, includes plug 724 on one end and terminals on other. Colors blue and amber.	-	-	-	137	-	ML-7660386-G5
			RESISTORS						
*1750	-	Control Relay Series Resistor	Wire wound, 50 ohms ±5%, Grade 1, Class I, Style C	63838F	RE 13A 372J	-	59	-	M-7464452-P18
1751 to 1754 Incl	-	Not Used	-	-	-	-	-	-	-
			SWITCHES						
1755	-	Remote-local Switch	Toggle, 2 circuits break-make, 2 circuits break, 1400 volts rms, 60 cycles, a-c test	-	-	-	344	Cat. No. H-70278-2	P-7763305-P2

△ Symbol part designation, if any.
ᵀ Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
CONTROL UNIT NAVY TYPE CG-23241

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	π	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
			SWITCHES (CONT'D)						
1756	-	Start-stop Switch for 4-wire Control	Tumbler switch, 125 volts, 30 amp D.P. or 250 volts, 20 amp	24062	-	-	137	-	M-7462691-P1
1757	-	Start-stop Switch for 6-wire Control	Start-stop switch, 2 contacts normally open	-	-	-	19	Type CR-2940	M-7464438-P1
1758	-	Emergency Stop Switch	Same as 1756	24062	-	-	-	-	-
			INDICATOR LAMPS						
1760	-	Power Indicator Lamp	Indicating lamp assembly rated 110 to 140 volts consisting of:	-	-	-	489	-	M-7460883-P3
*1760	A		Cap: red	-	-	-	-	-	K-2841431-P2
*1760	B		Lamp: 18 volts, 0.11 amp	-	-	-	-	G-E Mazda T-4	
			Resistor: 1200 ohms	-	-				
1760	C		Resistor: 1200 ohms	-	-	-	-	-	QLK-1924006
1761 to 1764 Incl	-	Not Used	-	-	-	-	-	-	-
			RELAYS						
†1765	-	Power Contactor	3 contacts normally open, 1 contact normally closed, Coil, 110 volts, 60 cycles	-	-	-	490	-	P-7763201-P14
			TRANSFORMERS						
1770	-	Contactor Circuit Transformer	Pri: 110/220 volts, 60 cycles Sec: 110 volts, 0.227 amp, kva 0.025	30684	-	-	138	Cat. No. 67G838	M-7465424-P1
1771 to 1799 Incl	-	Not Used	-	-	-	-	-	-	-
			MICROPHONE						
	-	Microphone	Hand-type, consists of non-	51004C	-	-	3	Type RS38A	K7890172-P1

△ Symbol part designation, if any.
π Style or other applicable designation, if any.
*SPARE PARTS FURNISHED. Refer to Table IV for quantities.
† Spare coils and contacts furnished. Refer to Table IV for quantities.

TABLE II (CONT'D)
PARTS LIST BY SYMBOL DESIGNATIONS
FOR
NAVY MODELS TCM-2 AND TCU-2 RADIO TRANSMITTING EQUIPMENT
CONTROL UNIT NAVY TYPE CG-23241

SYMBOL DESIGNATION △		FUNCTION	DESCRIPTION	NAVY TYPE DESIG.	NAVY DWG. OR SPEC. NUMBER	TT	MFR.	MFR. DESIG.	G.E. COMPANY DRAWING AND PART NUMBER
MICROPHONE (CONT'D)									
	-	Microphone	C o n t i n u e d locking push to talk switch, 4 ft. shielded two conductor cord, and three circuit plug Navy Type 49007, microphone 213 ohms	51004C	-	-	3	Type RS38A	K7890172-P1

△ Symbol part designation, if any.
TT Style or other applicable designation, if any.

TABLE IV
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION I - H-F RADIO TRANSMITTER NAVY TYPE CG-52206

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					MISCELLANEOUS (CLASS 10)					
1	1	1	--	362, 363, 364	Panel Illuminating Lamp, 3 candle power, 6-8 volts, double contact base		66	Mazda #64		K-7890067-P54
2	1	3	--	365A	Red Jewel with Bezel Ring for Indicator Lamp Globe		486			K-7871647-P2
					METERS (CLASS 22)					
3	1	1	-22026	346	Ammeter, scale 0-5 amp, r-f, 2 1/2 in. diam. flush, phenolic case, anti-glare glass, internal thermocouple		65	8DW-44		P-7761557-P4
4	1	1	-22057	340, 344	Milliammeter, scale 0-50 ma., d-c, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	8DW-41		P-7761557-P1
5	1	1	-22058	341, 342, 345	Milliammeter, scale 0-100 ma., d-c, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	8DW-41		P-7761557-P2
6	1	1	-22068	343	Milliammeter, scale 0-500 ma., d-c, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	8DW-41		P-7761557-P3
7	1	1	-22079	347	Voltmeter, scale 0-10 volts, a-c with red mark on scale at 6.3 volts, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	8AW-41		P-7761557-P9
8	1	1	-22269	348	Modulator Indicator, scale 0-150 volts, a-c, 200-3000 cycles, copper-oxide rectifier type, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	8DW-46		P-7761557-P6

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION I - H-P RADIO TRANSMITTER NAVY TYPE CG-52206

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					SWITCHES (CLASS 24)					
9	1	1	-24001	382, 383	Toggle, double pole, single throw, 1 amp., 250 volts, 3 amp., 125 volts		137	Cat. # 1GA2A21		K-7890067-57
10	1	2	-24067	385	Interlock, 10 amp, 250 volts		155			ML-7460330-G4
11	1	1	--	386	Test Key Toggle, telephone type, single-pole, double-throw, 3 amp., not more than 110 watts. Test voltage 500 volts a-c, 60 cycles		486	Type Z-2877		M-7461816-P1
					RELAY PARTS (CLASS 29)					
12	1	8	--	387A	Screw and Contact		487			ML-7871663-G1
13	1	16	--	387B	Contact		487			ML-7870259-G1
14	1	8		387C	Contact		487			ML-7873178-G1
15	1	2		387D	Coil		487			ML-7462352-G3
16	1	16		387E	Contact		487			ML-7869530-G2
					VACUUM TUBES (CLASS 38)					
17	1	2	-803	403	R-f Power Amplifier, Pentode Type		485	Type 803		K-7890067-61
18	1	4	-837	400, 401, 402, 404	R-f Power Amplifier and Oscillator, Pentode Type		485	Type 837		K-7890067-60
					CHOKE COILS (CLASS 47)					
19	1	1	--	316	Consists of 300 turns of 0.010 in. diam. bare tinned copper wire (0.018 in. diam. D.C.C.) Universal wound, 2 crosses per turn on 1/2-in. O.D. Isolantite form		137			ML-7462709-G1

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION I - H-F RADIO TRANSMITTER NAVY TYPE CG-52206

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					CHOKE COILS (CLASS 47) - CONTINUED -					
20	1	1	--	317, 318	Consists of 200 turns of 0.010 in. diam. bare tinned copper wire (0.018 in. diam. D.C.C.) Universal wound, 2 crosses per turn on 1/2-in. O.D. Isolantite form		137			ML-7462716-G1
21	1	3	--	319, 320, 326, 327, 328	Consists of 150 turns of 0.010 in. diam. bare tinned copper wire (0.018 in. diam D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form		137			ML-7462716-G2
22	1	1		321, 324	Consists of 75 turns of 0.020 in. diam. bare tinned copper wire (0.028 in. diam. D.C.C.) Universal wound, 4 crosses per turn on 1/2 in. O.D. Isolantite form		137			ML-7462716-G3
23	1	1		323	Consists of 100 turns of 0.016 in. diam. bare tinned copper wire (0.0184 in. diam. double enamel) wound on 1-in. O.D. Isolantite form		137			ML-7462772-G1
					CAPACITORS (CLASS 48)					
24	1	1	-48011-B10	205, 241	Mica: 0.0005 mu f ±10%, 600 volts d-c working		329	Cat. # 9LS-13050		P-7761560-P2
25	1	9	-48027-B10	204, 206, 210, 211, 212, 213, 214, 216, 218, 219, 220, 226, 227, 229, 230, 240, 242, 247	Mica: 0.01 mu f ±10%, 600 volts d-c working		329	Cat. # 9LS-11010		P-7761560-P1

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION I - H-F RADIO TRANSMITTER NAVY TYPE CG-52206

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					CHOKE COILS (CLASS 47) - CONTINUED -					
26	1	2	-48035-B10	208, 215, 223, 253	Mica: 0.01 mu f ±10%, 1200 volts d-c working		329	Cat. # 9LS-21010		P-7761560-P3
27	1	1	-48038-B5	207, 225	Mica: 0.00005 mu f ±5%, 2000 volts		329	Cat. # 9LS-54050		P-7761560-P10
28	1	1	-48337-C5	236	Mica: 0.001 mu f ±5%, 5000 volts test		329	Cat. # PL-246-6LST		P-7761566-P18
29	1	1	-48380-5	239	Mica: 0.0003 mu f ±5%, 10,000 volts test		329	Cat. #PL-763-50		M-7462694-P3
30	1	1	-48403	245, 250	Paper, Pyranol askarel-filled: 2 mu f -2.5%+10%, 400 volts d-c working		7	Cat. # VC-278		M-7462695-P1
31	1	2	-48409-B10	231, 232, 233, 234	Mica: 0.005 mu f ±10%, 1200 volts d-c working		329	Cat. # 9LS-22050		P-7761560-P9
32	1	1	-48426-C5	224	Mica: 0.0003 mu f ±5%, 5000 volts test		329	Cat. # PL-611-6LST		P-7761566-P16
33	1	2	-48721	248, 251, 254	Paper, Pyranol askarel-filled: 10 mu f, 600 volts d-c working		10	Model No. 9CE5A87		M-7464792-P4
34	1	1	-48802	255	Paper, Pyranol askarel-filled: 0.25 mu f, 1000 volts d-c		10	Model No. 9CE6A15		P-7763475-P11
35	1	1	-48847-B10	228	Mica: 0.006 mu f ±10%, 300 volts d-c working		7	Cat. # 1WLS		P-7762455-P27
36	1	1	-48883-	243, 249	Paper, Pyranol askarel-filled: 2 mu f, 600 volts d-c working		10	Model No. 9CE5A93		--
37	1	1	-48910-B5	209	Mica: 0.00005 mu f ±5%, 1200 volts d-c working		329	Cat. # 9LS-24050		P-7761560-P4

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION I - H-F RADIO TRANSMITTER NAVY TYPE CG-52206

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIPICATION	G. E. DRAWING & PART NO.
					CHOKE COILS (CLASS 47) - CONTINUED -					
38	1	1	-48911-B10	222	Mica: 0.00006 mu f ±10%, 1200 volts d-c working		329	Cat. # 9LS-24060		P-7761560-P12
39	1	1	-48913-B10	221	Mica: 0.002 mu f ±10%, 1200 volts d-c working		329	Cat. # 9LS-22020		P-7761560-P11
40	1	1	-48915-5	235	Mica: 0.005 mu f ±5%, 5000 volts test		329	Cat. # PL-178-50		M-7462694-P1
41	1	1	-48916	246	Paper, Pyranol askarel-filled: 0.15 mu , 405 volts a-c, 1000 cycles		10			M-5213288-G1
42	1	1	-481474-E1	202	Mica: 290 mu mu f ±1.0%, 500 volts d-c working, Molded Silver Cap		16			M-7465676-P22
43	1	1	-481475-0003N1	201	Ceramic: 100 mu mu f ±1.0% -0.0003 mu mu f/mu mu f/deg. C. 500 volts d-c working		8	Class E		K7885330-P1
					RESISTORS (CLASS 63)					
44	1	1	-63288	278	Metallized: 5000 ohms ±10%, 1 watt		28	Type BT-1		P-7761577-P23
45	1	1	-63288	281	Metallized: 100,000 ohms ±10%, 1 watt		28	Type BT-1		P-7761577-P1
46	1	1	-63288	286	Metallized: 50,000 ohms ±10%, 1 watt		28	Type BT-1		P-7761577-P3
47	1	1	-63288	290	Metallized: 2200 ohms ±10%, 1 watt		28	Type BT-1		P-7762300-P66
48	1	1	-63291	283	Metallized: 30,000 ohms ±5%, 1 watt		28	Type BT-1		P-7761577-P2

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION I - H-F RADIO TRANSMITTER NAVY TYPE CG-52206

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					RESISTORS (CLASS 63) - CONTINUED -					
49	1	1	-63474	265	Metallized: 50,000 ohms ±10%, 2 watts		28	Type BT-2		P-7761577-P24
50	1	1	-63637	282	Wire wound: 500 ohms ±5%, 2 watts		28	Type AA		P-7761577-P21
51	1	1	-63640	289	Wire wound: 2500 ohms ±5%, 2 watts		28	Type AA		P-7761577-P25
52	1	1	-63641	268, 271	Wire wound: 30,000 ohms ±5%, 12 watts		28	Type DJ		P-7761577-P9
53	1	1	-63644	277	Wire wound: 500 ohms ±5%, 20 watts		28	Type EP		P-7761577-P14
54	1	1	-63645	267	Wire wound: 5000 ohms ±5%, 20 watts		28	Type EP		P-7761577-P22
55	1	1	-63646	284	Wire wound: 25,000 ohms tapped at 10,000 ohms, ±10%, 20 watts		28	Type EP		P-7761577-P19
56	1	1	-63673	280	Variable: Curve A, 75,000 ohms, Curve B, 13,000 ohms semilog-arithmic taper		5	Type C		M-7461827-P1
57	1	1	--	276	Rheostat, 3500 ohms, 50 watts, 119 ma max		165	Model J		M-7462674-P5

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION II - RECTIFIER UNIT NAVY TYPE CG-20122

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					MISCELLANEOUS (CLASS 10)					
58	1	2	--	660, 661	Indicator Lamp Bulb, 3 candle power, 6-8 volts, double contact base		486	Mazda #64		--
59	1	1	--	660A	Red jewel with bezel ring for indicating lamp globe		486			K-7871647-P2
					METERS (CLASS 22)					
60	1	1	-22079	665	Voltmeter, scale 0-10 volts, a-c, with red mark on scale at 6.3 volts, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	Type 8AW-41		P-7761557-P9
61	1	1	-22270	666, 667	Voltmeter, scale 0-2 kv d-c, sensitivity of 1000 ohms per volt, furnished with one two-tube cage multiplier (667). 2 1/2-in. diam. flush, phenolic case, anti-glare glass		65	Type 8DW-41		P-7761557-P10
62	1	1	-22085	668	Voltmeter, scale 0-150 volts a-c, 2 1/2-in. diam flush, phenolic case, anti-glare glass		65	Type 8AW-41		P-7761557-P11
					SWITCHES (CLASS 24)					
63	1	1	-24001	647	Toggle, double-pole, single-throw, 1 amp, 250 volts, 3 amp, 125 volts		137	Cat. # 1GA2A21		--
64	1	2	-24067	653	Interlock, 10 amp, 250 volts		55			ML-7460330-G4
65	1	1	--	650, 651	Toggle, double-pole, single-throw, 30 amp, 125 volts		137			M-7462691-P1
66	1	1	--	654	Circuit Breaker, 2 pole, 20 amp, 115 volts a-c		489	Type AF-1 (Modified)		P-7764268-P2

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION II - RECTIFIER UNIT NAVY TYPE CG-20122

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					FUSES (CLASS 28)					
67	1	10	--	694	Cartridge, non-renewable, 1 amp, 250 volts		137	Cat. # 59950		--
68	1	10	--	695, 696	Cartridge, non-renewable, 0.75 amp, 2000 volts		137	Cat. # 230074		--
69	1	2	--	697	Cartridge, renewable, 20 amp, 250 volts		137	Cat. # GE1025		--
70	1	10	--	697A	Fuse Link, 20 amp, 250 volts		137	Cat. # GE 1102		--
71	1	2	--	698, 699	Cartridge, renewable, 3 amp, 250 volts		137	Cat. # GE 1017		--
72	1	10	--	698A, 699A	Fuse Link, 3 amp, 250 volts		137	Cat. # GE 1094		--
					RELAY PARTS (CLASS 29)					
73	1	1	--	672A, 673A	Coil		490			F-22072-G108
74	1	4	--	672B, 673B	Movable Contact		490			K-5303307-G32
75	1	4	--	672C, 673C	Stationary Contact		490			M-5197821-G1
76	1	1	--	674A	Coil		490			F-22D2-G229
77	1	1	--	674B	Synchronous Timer		490			K-5305284-P22
78	1	4	--	674C	Stationary Contact		490			K-3805657
79	1	4	--	674D	Movable Contact		490			K-4901681-G1
80	1	4	--	674E	Movable Contact		490			K-3805658-G1
					VACUUM TUBES (CLASS 38)					
81	1	4	-836	643, 644	Half-Wave, High Vacuum Rectifier Tube		69	CNU-836		--

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION II - RECTIFIER UNIT NAVY TYPE CG-20122

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					CAPACITORS (CLASS 48)					
82	1	2	-48027-B10	605, 606, 607	Mica: 0.01 mfd ±10%, 600 volts d-c working		329	Cat. # 9LS-11010		P-7761560-P1
83	1	1	-48721	600, 601	Paper, pyranol askarel-filled: 10 mu f, 600 volts d-c working		329	Model No. 9CE5A87		M-7464792-P4
84	1	1	-48917	602, 603	Paper, pyranol askarel-filled: 10 mu f, 1500 volts d-c working		10	Model No. 9CE5A92		P-7762164-P3
					RESISTORS (CLASS 63)					
85	1	1	-63088E	620	Wire wound: 8000 ohms, Grade 1, Class 2, Style D		59			M-7464052-P40
86	1	1	-63145E	624	Wire wound: 3000 ohms, Grade 1, Class 2, Style B		59			P-7762172-P20
87	1	1	-63148E	621	Wire wound: 4500 ohms, Grade 1, Class 2, Style B		59			P-7762172-P26
88	1	2	-63149F	615, 616, 617, 618	Wire wound: 5000 ohms, Grade 1, Class 1, Style B		59			M-7464451-P38
89	1	1	-63152F	623	Wire wound: 8000 ohms, Grade 1, Class 1, Style B		59			M-7464451-P40
90	1	1	-63275F	628	Wire wound: 50 ohms, Grade 1, Class 1, Style E		59			M-7464454-P18
91	1	1	-63559F	631	Wire wound: 4 ohms, Grade 1, Class 1, Style E		59			M-7464454-P7
92	1	2	-63229	622, 625, 626, 627	Wire wound: 2000 ohms, tapped 10 equal values, Grade 1, Class 1, Style B		165			K47J705-P1

TABLE IV
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION III - CONTROL UNIT NAVY TYPE CG-23241

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					MISCELLANEOUS (CLASS 10)					
93	1	3	--	1760	Indicating Lamp		489	Cat. # 2821706-G11		--
94	1	3	--	1760B	Indicating Lamp Bulb, 18 volts 0.11 amp		489	Mazda T-4		--
95	1	3	--	1760B	Indicator Lamp Cap (red)		489			K-2841431-P2
					RELAY PARTS (CLASS 29)					
96	1	1	--	1765A	Coil		490	Cat. # 22D2G227		--
97	1	4	--	1765B	Stationary Contact		490			K-4900573-G1
98	1	4	--	1765C	Stationary Contact		490			K-4900573-G2
99	1	4	--	1765D	Stationary Contact		490			K-4900573-G3
100	1	4	--	1765E	Stationary Contact		490			K-4900573-G4
101	1	4	--	1765F	Movable Contact		490			K-3863767-G2
					RESISTORS (CLASS 63)					
102	1	1	-63838F	1750	Wire wound: 50 ohms ±5%, Grade 1, Class 1, Style C		59			M-7464452-P18

TABLE IV
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION I - I-F RADIO TRANSMITTER NAVY TYPE CG-52205

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					MISCELLANEOUS (CLASS 10)					
1	1	1	--	564A	Red jewel with bezel ring for indicating lamp		486			K-7871647-P2
2	1	3		565, 566, 567	Indicator Lamp Bulb, 3 candle power, 6-8 volts, double contact base		66	Mazda #64		--
					METERS (CLASS 22)					
3	1	1	-22053	568	Milliammeter, scale 0-10 ma, d-c, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	Type 8DW-41		P-7761557-P12
4	1	1	-22057	572	Milliammeter, scale 0-50 ma, d-c, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	Type 8DW-41		P-7761577-P1
5	1	1	-22058	569, 570	Milliammeter, scale 0-100 ma, d-c, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	Type 8DW-41		P-7761557-P2
6	1	1	-22068	571	Milliammeter, scale 0-500 ma, d-c, 2 1/2 in. diam. flush, phenolic, case, anti-glare glass		65	Type 8DW-41		P-7761557-P3
7	1	1	-22079	573	Voltmeter, scale 0-10 volts, a-c, with red mark on scale at 6.3 volts, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	Type 8AW-41		P-7761557-P9
8	1	1	-22268	574	Ammeter, scale 0-8 amp, r-f, 2 1/2 in. diam flush, phenolic case, anti-glare glass, internal thermocouple		65	Type 8DW-44		P-7761557-P8
					SWITCHES (CLASS 24)					
9	1	1	-24001	556, 557	Toggle, double-pole, single-throw, 1 amp, 250 volts, 3 amp, 125 volts		137	Cat. # 1GA2A21		--

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION I - I-F RADIO TRANSMITTER NAVY TYPE CG-52205

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					SWITCHES (CLASS 24) - CONTINUED -					
10	1	2	-24067	559	Interlock, 10 amp., 250 volts		55			ML-7460330-G4
11	1	1	--	558	Test Key, toggle telephone type, single-pole, double-throw, 3 amp, not more than 100 watts. Test voltage 500 volts a-c, 60 cycles		344	Cat. # Z-2877		M-7461816-P1
					RELAY PARTS (CLASS 29)					
12	1	1	--	577A	Coil		487			ML-7462352-G3
13	1	16	--	577B	Stationary Contact		487			K-7869530-G2
14	1	16	--	577C	Movable Contact		487			ML-7870259-G1
15	1	8	--	577D	Stationary Contact		487			ML-7871663-G1
16	1	8	--	577E	Movable Contact		487			ML-7873178-G1
					VACUUM TUBES (CLASS 38)					
17	1	2	803	547	R-F Power Amplifier, Pentode Type		485	Type 803		--
18	1	3	837	544, 545, 456	R-F Power Amplifier and Oscillator, Pentode Type		485	Type 837		--
					CHOKE COILS (CLASS 47)					
19	1	1	--	531, 532	Consists of 900 turns of 0.010 in. bare copper wire (0.018 in. D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form		137			ML-7462717-G1
20	1	1	--	534, 535	Consists of 200 turns of 0.010 in. bare copper wire (0.018 in. diam. D.C.C.) Universal wound, 2 crosses per turn, on 1/2 in. O.D. Isolantite form		137			ML-7462716-G1

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION I - I-F RADIO TRANSMITTER NAVY TYPE CG-52205

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					CHOKE COILS (CLASS 47) - CONTINUED -					
21	1	1	--	536	Consists of 575 turns of 0.010 1 w. diam. copper wire (0.018 in. D.C.C.) Universal wound, 2 crosses per turn on 1/2 in. O.D. Isolantite form.		137			ML-7462718-G1
22	1	1	--	537	Consists of 2 coils, each having 235 turns of 0.159 in diam. bare copper wire (0.0239 in. D.C.C.) Universal wound, 2 crosses per turn on 1/2-in. O.D. Isolantite form.		137			ML-7462712-G1
					CAPACITORS (CLASS 48)					
23	1	1	-48011-B10	454	Mica: 0.0005 mu f ±10%, 600 volts d-c working		329	Cat. # 9LS-13050		P-7761560-P2
24	1	9	-48027-B10	455, 456, 459, 463, 464, 465, 471, 472, 473, 474A, 474B, 484, 485, 486, 487, 488, 489	Mica: 0.01 mu f ±10%, 600 volts d-c working		329	Cat. # 9LS-11010		P-7761560-P1
25	1	2	-48035-B10	457, 467, 493	Mica: 0.01 mu f ±10%, 1200 volts d-c working		329	Cat. # 9LS-21010		P-7761560-P3
26	1	1	-48366-C5	461, 469	Mica: 0.0002 mu f ±5%, 5000 volts d-c test		329	Cat. # PL-307-6LST		P-7761566-P17
27	1	1	-48382-B10	475	Mica: 0.01 mu f ±10%, 2500 volts d-c working		329	Cat. # 9LS-51010		P-7761560-P7
28	1	1	-48719	491	Paper, pyranol askarel-filled: 1 mu f, 600 volts d-c		10	Model # 9CE5A90		--
29	1	1	-48802	492, 497	Paper, pyranol askarel-filled: 0.25 mu f, 1000 volts d-c working		10	Model # 9CE6A15		P-7763475-P11

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION I - I-F RADIO TRANSMITTER NAVY TYPE CG-52205

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					CAPACITORS (CLASS 48) - CONTINUED -					
30	1	1	-48912-B10	458, 470	Mica: 0.0005 mu f ±10%, 1200 volts d-c working		329	Cat. # 9LS-23050		P-7761560-P5
31	1	1	-48914-D2	451, 452	Mica: 0.0011 mu f/0.0027 mu f, ±2%, 1000 volts d-c test		7	Cat. # PL-892-6H		ML-7462693-P2
32	1	1	-48916	490	Paper, pyranol askarel-filled: 0.15 mu f, 405 volts a-c, 1000 cycles		10			M-5213288-G1
33	1	1	-48951-C5	476	Mica: 0.000185 mu f, ±5%, 5000 volts d-c test		329	Cat. # PL-556-6LST		P-7761566-P15
					RESISTORS (CLASS 63)					
34	1	1	-63288	517	Metallized: 2200 ohms ±10%, 1 watt		28	Type BT-1		P-7762300-P66
35	1	1	-63638	508	Wire wound: 800 ohms ±5%, 2 watts		28	Type AA		P-7761577-P5
36	1	1	-63639	512	Wire wound: 2000 ohms ±5%, 2 watts		28	Type AA		P-7761577-P7
37	1	1	-63640	505	Wire wound: 2500 ohms ±5%, 2 watts		28	Type AA		P-7761577-P4
38	1	2	-63641	506, 507, 513, 514	Wire wound: 30,000 ohms ±5%, 12 watts		28	Type DJ		P-7761577-P9
39	1	1	-63474	504	Wire wound: 50,000 ohms ±10%, 2 watts		28	Type BT-2		P-7761577-P24
40	1	1	-63642	509	Wire wound: 40 ohms ±10%, 20 watts		28	Type EP		P-7761577-P13
41	1	1	-63643	510	Wire wound: 80 ohms ±5%, 20 watts		28	Type EP		P-7761577-P12
42	1	1	-63644	516	Wire wound: 500 ohms ±5%, 20 watts		28	Type EP		P-7761577-P14

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCM-2 TRANSMITTER UNIT
SECTION II - RECTIFIER UNIT NAVY TYPE CG-20122

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOLS DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					MISCELLANEOUS (CLASS 10)					
58	1	2	--	660, 661	Indicator Lamp Bulb, 3 candle power, 6-8 volts, double contact base		486	Mazda #64		--
59	1	1	--	660A	Red Jewel with Bezel Ring for Indicating Lamp Globe		486			K-7871647-P2
					METERS (CLASS 22)					
60	1	1	-22079	665	Voltmeter, scale 0-10 volts, a-c, with red mark on scale at 6.3 volts, 2 1/2 in. diam. flush, phenolic case, anti-glare glass		65	Type 8AW-41		P-7761557-P9
61	1	1	-22270	666, 667	Voltmeter, scale 0-2 kv d-c, sensitivity of 1000 ohms per volt, furnished with one two-tube cage multiplier (667), 2 1/2 in. diam flush, phenolic case, anti-glare glass		65	Type 8DW-41		P-7761557-P10
62	1	1	-22085	668	Voltmeter, scale 0-150 volts a-c, 2 1/2 in. diam. flush, phenolic case anti-glare glass		65	Type 8AW-41		P-7761557-P11
					SWITCHES (CLASS 24)					
63	1	1	-24001	647	Toggle, double-pole, single-throw, 1 amp, 250 volts, 3 amp, 125 volts		137	Cat. # 1GA2A21		--
64	1	2	-24067	653	Interlock, 10 amp, 250 volts		55			ML-7460330-G4
65	1	1	--	650, 651	Toggle, double-pole, single-throw, 30 amp, 125 volts		137	Cat. # 235685		M-7462691-P1
66	1	1	--	654	Circuit Breaker, 2 pole, 20 amp, 115 volts a-c		489	Type AF-1 Modified		P-7764268-P2

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION II - RECTIFIER UNIT NAVY TYPE CG-20122

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					FUSES (CLASS 28)					
67	1	10	--	694	Cartridge, non-renewable, 1 amp, 250 volts		137	Cat. # 59950		--
68	1	10	--	695, 696	Cartridge, non-renewable, 0.75 amp., 2000 volts		137	Cat. # 230074		--
69	1	2	--	697	Cartridge, renewable, 20 amp, 250 volts		137	Cat. # GE1025		--
70	1	10	--	697A	Fuse Link, 20 amp, 250 volts		137	Cat. # GE1102		--
71	1	2	--	698, 699	Cartridge, renewable, 3 amp, 250 volts		137	Cat. # GE1017		--
72	1	10	--	698A, 699A	Fuse Link, 3 amp, 250 volts		137	Cat. # GE1094		--
					RELAY PARTS (CLASS 29)					
73	1	1	--	672A, 673A	Coil		490			F-22D72-G108
74	1	4	--	672B, 673B	Movable Contact		490			K-5303307-G32
75	1	4	--	672C, 673C	Stationary Contact		490			M-5197821-G1
76	1	1	--	674A	Coil		490			F-22D2-G229
77	1	1	--	674B	Synchronous Timer		490			K-5305284-P22
78	1	4	--	674C	Stationary Contact		490			K-3805657
79	1	4	--	674D	Movable Contact		490			K-4901681-G1
80	1	4	--	674E	Movable Contact		490			K-3805658-G1
					VACUUM TUBES (CLASS 38)					
81	1	4	-836	643, 644	Half-Wave, High Vacuum Rectifier Tube		69	CNU-836		--

TABLE IV (CONT'D)
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION II - RECTIFIER UNIT NAVY TYPE CG-20122

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					CAPACITORS (CLASS 48)					
82	1	2	-48027-B10	605, 606, 607	Mica: 0.01 mfd ±10%, 600 volts d-c working		329	Cat. # 9LS-11010		P-7761560-P1
83	1	1	-48721	600, 601	Paper, pyranol askarel-filled: 10 mu f, 600 volts d-c working		329	Model No. 9CE5A87		M-7464792-P4
84	1	1	-48917	602, 603	Paper, pyranol askarel-filled: 10 mu f, 1500 volts d-c working		10	Model No. 9CE5A92		P-7762164-P3
					RESISTORS (CLASS 63)					
85	1	1	-63088E	620	Wire wound: 8000 ohms, Grade 1, Class 2, Style D		59			M-7464052-P40
86	1	1	-63145E	624	Wire wound: 3000 ohms, Grade 1, Class 2, Style B		59			P-7762172-P20
87	1	1	-63148E	621	Wire wound: 4500 ohms, Grade 1, Class 2, Style B		59			P-7762172-P26
88	1	2	-63149F	615, 616. 617, 618	Wire wound: 5000 ohms, Grade 1, Class 1, Style B		59			M-7464451-P38
89	1	1	-63152F	623	Wire wound: 8000 ohms, Grade 1, Class 1, Style B		59			M-7464451-P40
90	1	1	-63275F	628	Wire wound: 50 ohms, Grade 1, Class 1, Style E		59			M-7464454-P18
91	1	1	-63559F	631	Wire wound: 4 ohms, Grade 1, Class 1, Style E		59			M-7464454-P7
92	1	2	-63229	622, 625, 626, 627	Wire wound: 2000 ohms, tapped 10 equal values, Grade 1, Class 1, Style B		165			M-7464451-P40

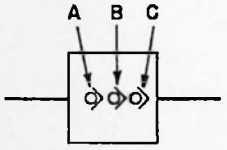
TABLE IV
SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS
NAVY MODEL TCU-2 TRANSMITTER UNIT
SECTION III - CONTROL UNIT NAVY TYPE CG-23241

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	G. E. DRAWING & PART NO.
					MISCELLANEOUS (CLASS 10)					
93	1	3	--	1760	Indicating Lamp		489	Cat. # 2821706-G11		--
94	1	3	--	1760B	Indicator Lamp Bulb, 18 volts, 0.11 amp		489	Mazda T-4		--
95	1	3	--	1760B	Indicator Lamp Cap (red)		489			K-2841431-P2
					RELAY PARTS (CLASS 29)					
96	1	1	--	1765A	Coil		490	Cat. # 22D2G227		--
97	1	4	--	1765B	Stationary Contact		490			K-4900573-G1
98	1	4	--	1765C	Stationary Contact		490			K-4900573-G2
99	1	4	--	1765D	Stationary Contact		490			K-4900573-G3
100	1	4	--	1765E	Stationary Contact		490			K-4900573-G4
101	1	4	--	1765F	Movable Contact		490			K-3863767-G2
					RESISTORS (CLASS 63)					
102	1	1	-63838F	1750	Wire wound: 50 ohms ±5%, Grade 1, Class 1, Style C		59			M-7464452-P18

TABLE V
APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

COLOR CODE IN MMFD. FOR CAPACITORS

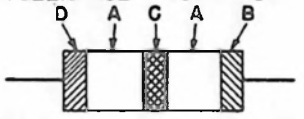
COLOR	A 1ST. DIGIT	B 2ND. DIGIT	C CYPHERS
BLACK	–	0	.0
BROWN	1	1	0
RED	2	2	00
ORANGE	3	3	000
YELLOW	4	4	0000
GREEN	5	5	00000
BLUE	6	6	000000
PURPLE	7	7	0000000
GREY	8	8	00000000
WHITE	9	9	000000000



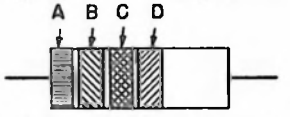
RMA COLOR CODE FOR RESISTORS

COLOR	A 1ST. DIGIT	B 2ND. DIGIT	C CYPHERS
BLACK	–	0	.0
BRDWN	1	1	0
RED	2	2	00
ORANGE	3	3	000
YELLOW	4	4	0000
GREEN	5	5	00000
BLUE	6	6	000000
PURPLE	7	7	0000000
GREY	8	8	00000000
WHITE	9	9	– –

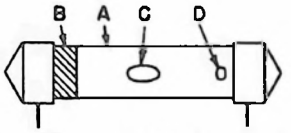
D- TOLERANCE GOLD= 5% SILVER=10% OMIT=20 %



ORIGINAL COLOR ARRANGEMENT FOR AXIAL LEADS



NEW COLOR ARRANGEMENT FOR AXIAL LEADS



STANDARD COLOR ARRANGEMENT FOR RADIAL LEADS

LIST OF MANUFACTURERS

CODE NUMBER	MFR. PREFIX	NAME	ADDRESS
3	CMX	Magnavox Co.	Fort Wayne, Ind.
5	CSA	Stackpole Carbon Co.	St. Mary's, Pa.
7	CD	Cornell-Dubilier Corp.	South Plainfield, N. J.
8	CBN	Central Radio Laboratory	Milwaukee, Wis.
10	CG	General Electric Co.	Pittsfield, Mass.
12	CHC	Hammarlund Mfg. Co.	New York, N. Y.
16	CFW	F. W. Sickles Co.	Springfield, Mass.
19	CG	General Electric Co.	Schenectady, N. Y.
28	CIR	International Resistance Co.	Philadelphia, Pa.
55	CFK	A. W. Franklin Mfg. Co.	New York, N. Y.
59	CAO	Ward Leonard Electric Co.	Mount Vernon, N. Y.
65	CG	General Electric Co.	West Lynn, Mass.
66	CG	General Electric Co.	Cleveland, Ohio
69	CNU	National Union Radio Corp.	Newark, N. J.
137	CG	General Electric Co.	Bridgeport, Conn.
138	CG	General Electric Co.	Ft. Wayne, Ind.
165	COM	Ohmite Mfg. Co.	Chicago, Ill.
189	CUA	Ucinite Co.	Newtonville, Mass.
322	CBK	Allen D. Cardwell Corp.	Brooklyn, N. Y.
329	CAN	Sangamo Electric Co.	Springfield, Ill.
344	CAU	Automatic Electric Co.	Chicago, Ill.
358	CEU	E. F. Johnson Co.	Waseca, Minn.
484		Waterman Products Co.	Philadelphia, Pa.
485	CWL	Westinghouse Lamp Works	Bloomfield, N. J.
486		Simmons Mfg. Co.	Ashland, Ohio
487		United Cinephone Co.	Torrington, Conn.
488	CUA	A. J. Ulmer Co.	New York, N. Y.
489	CG	General Electric Co.	Philadelphia, Pa.
490	CG	General Electric Co.	Bloomfield, N. J.

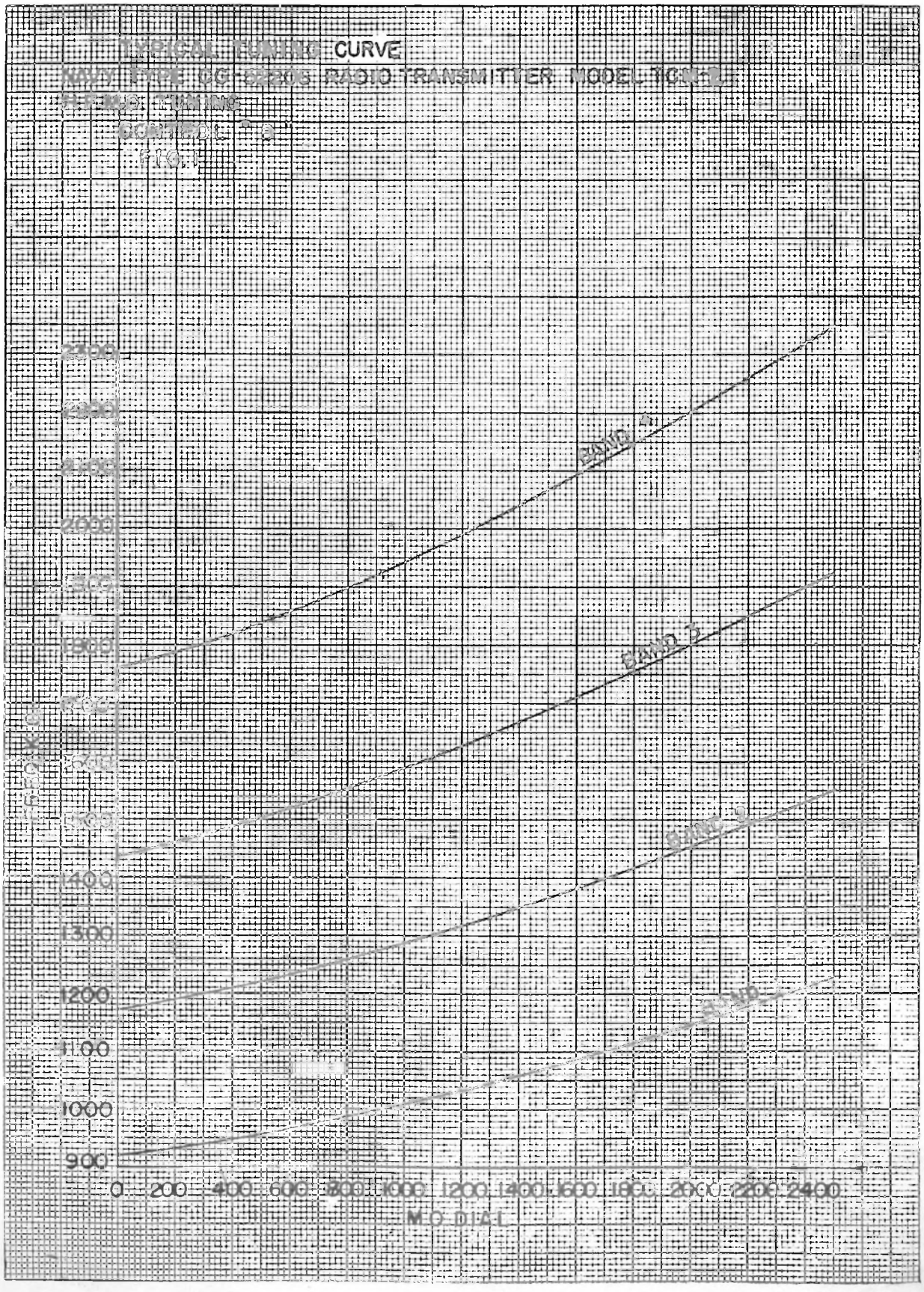


Fig. 1. Typical M-o Tuning, H-f Radio Transmitter, Navy Type CG-52206, Model TCM-2

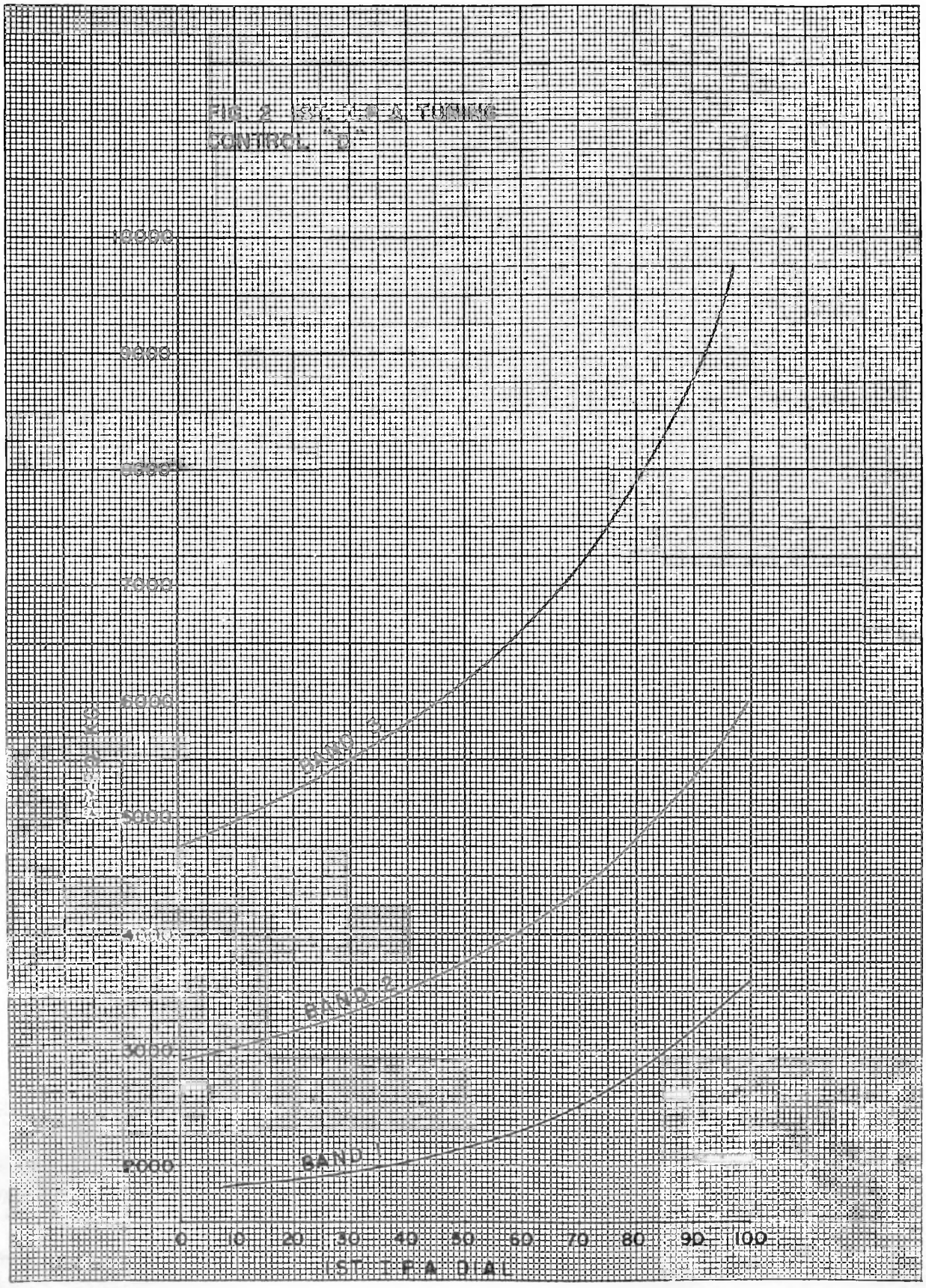


Fig. 2. Typical 1st. I-p-a Tuning, H-f Radio Transmitter, Navy Type CG-52206

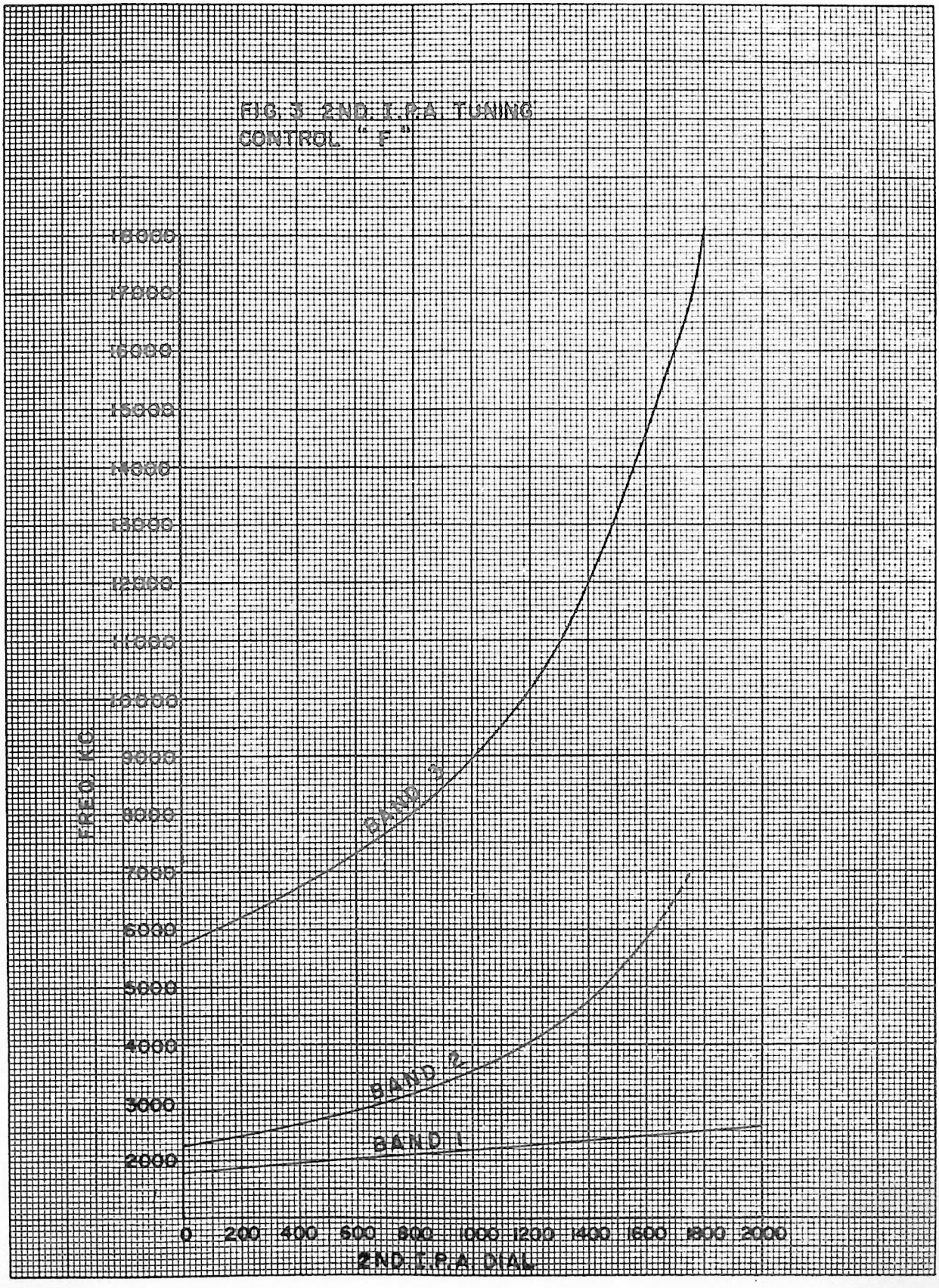


Fig. 3. Typical 2nd. I-p-a Tuning, H-f Radio Transmitter, Navy Type CG-52206

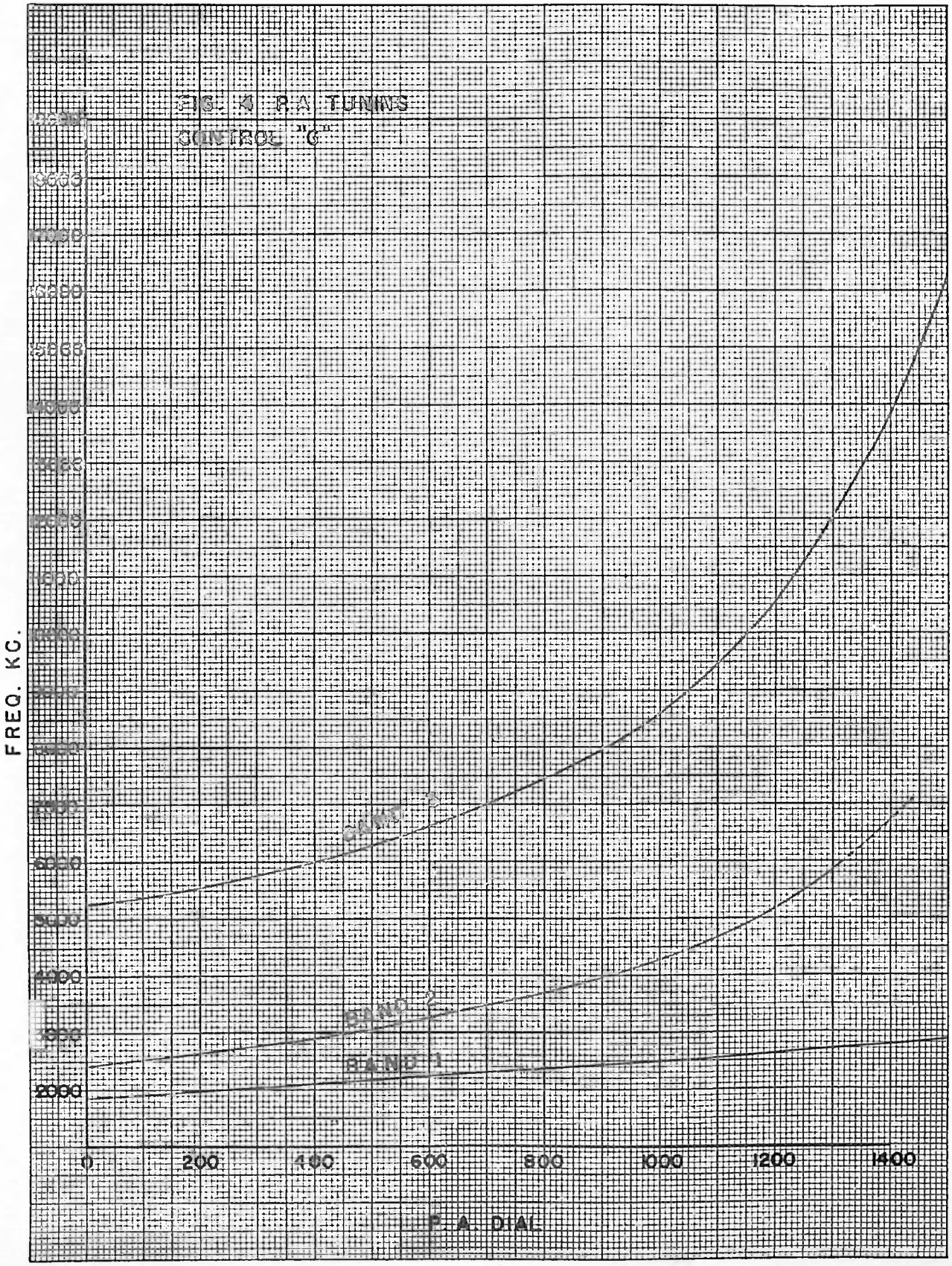


Fig. 4. Typical P-a Tuning, H-f Radio Transmitter, Navy Type CG-52206

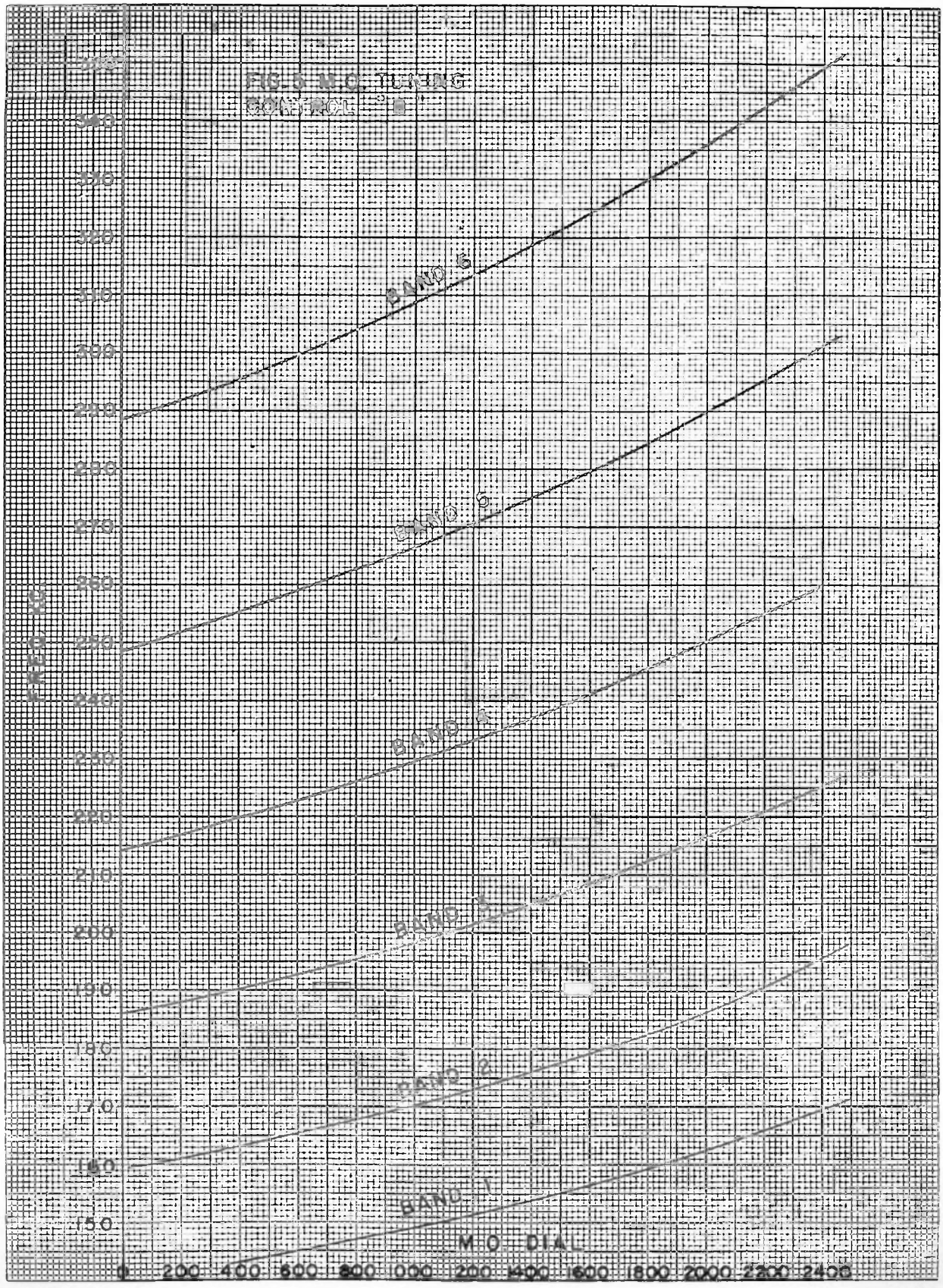


Fig. 5. Typical M-o Tuning, I-f Radio Transmitter, Navy Type CG-52205

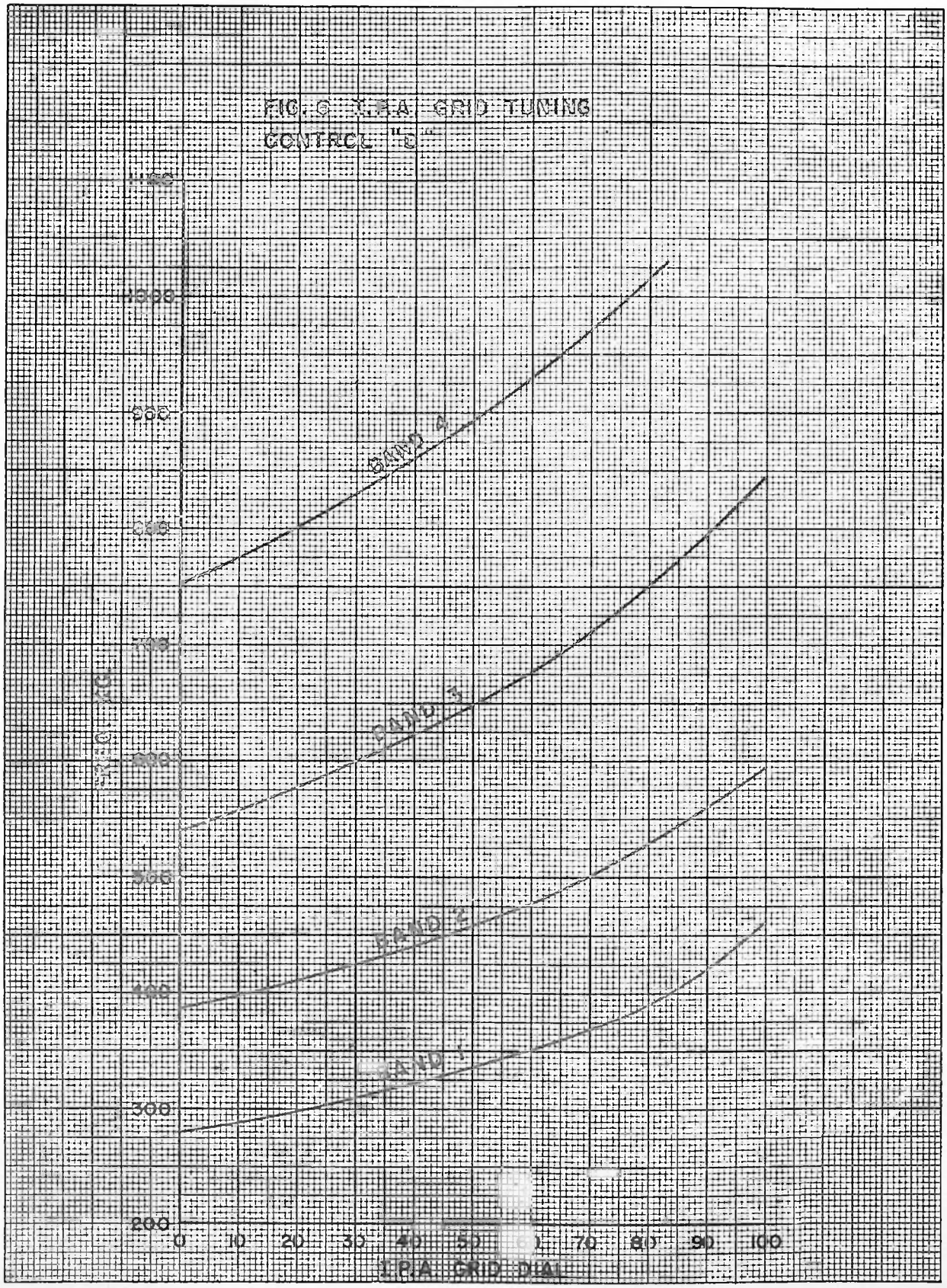


Fig. 6. Typical I-p-a Grid Tuning, I-f Radio Transmitter, Navy Type CG-52205

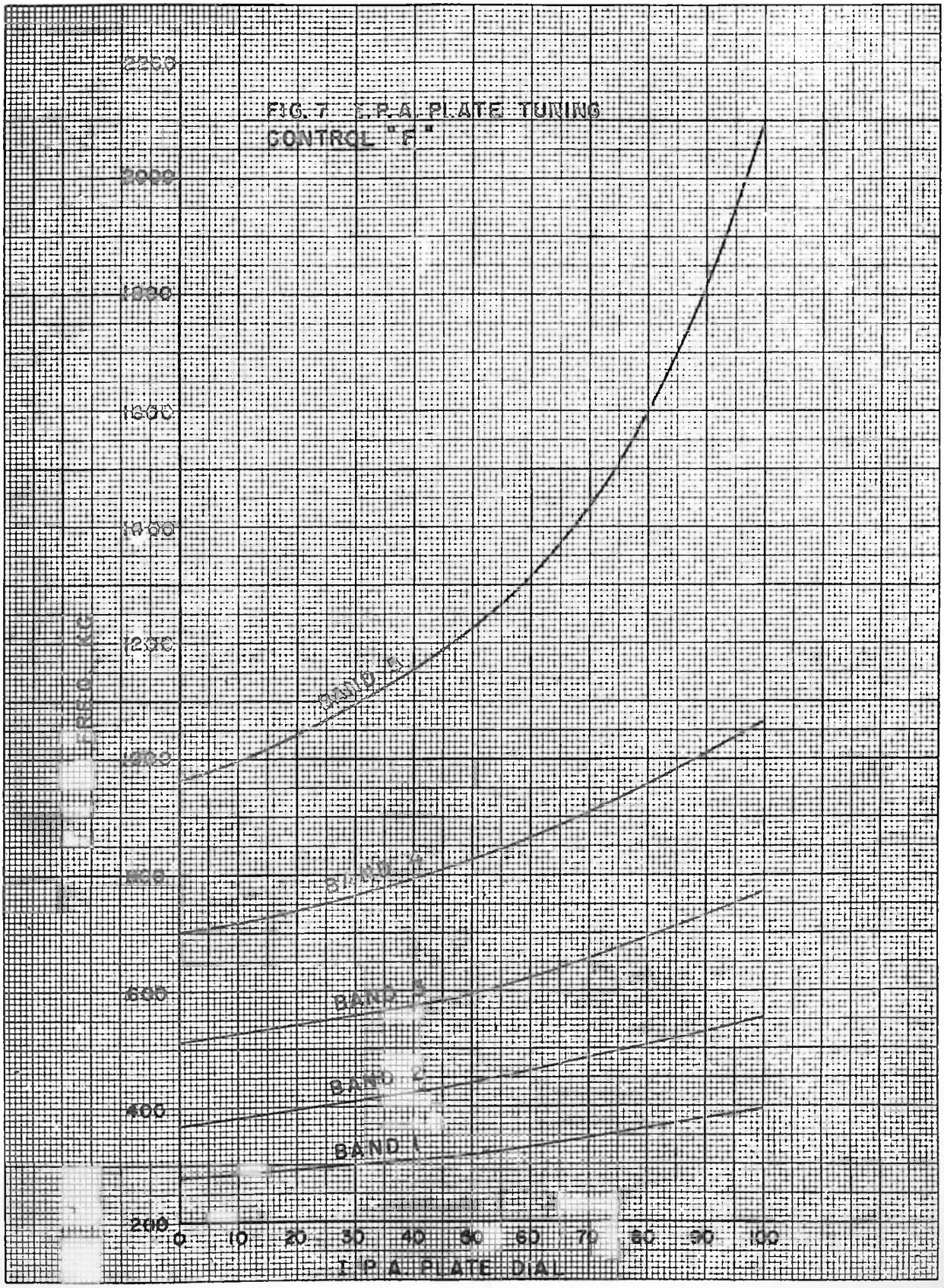


Fig. 7. Typical I-p-a Plate Tuning, I-f Radio Transmitter, Navy Type CG-52205

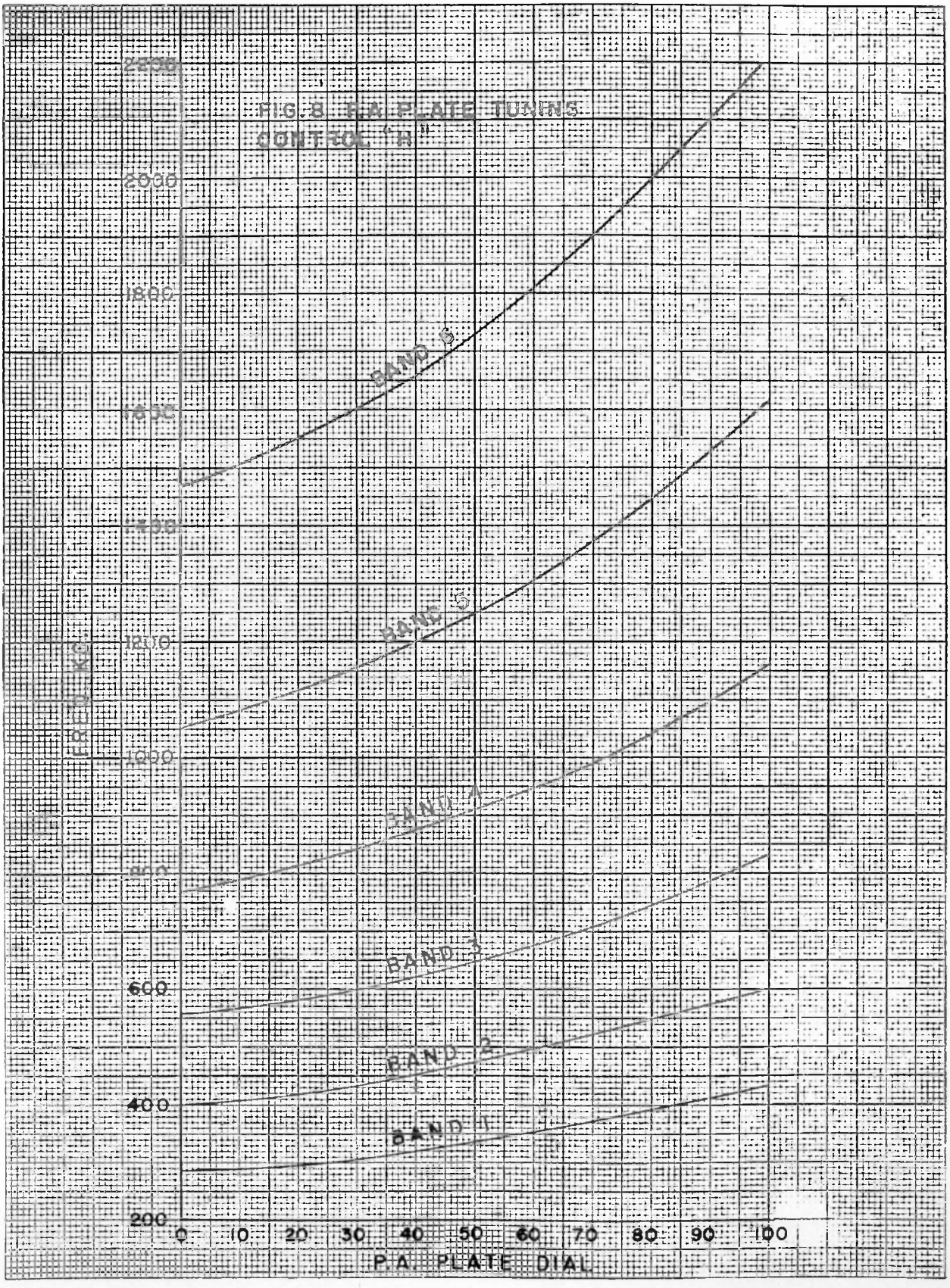
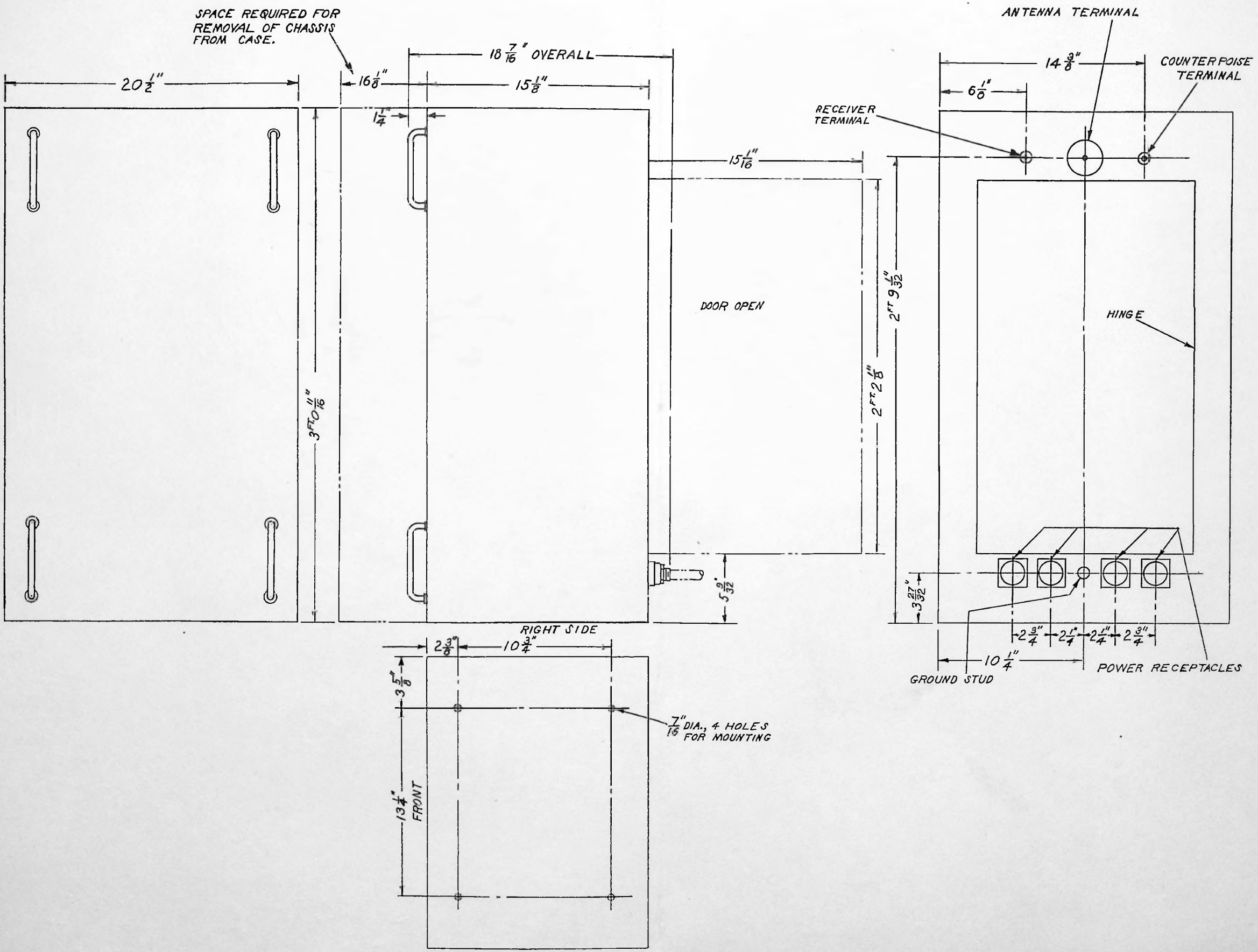


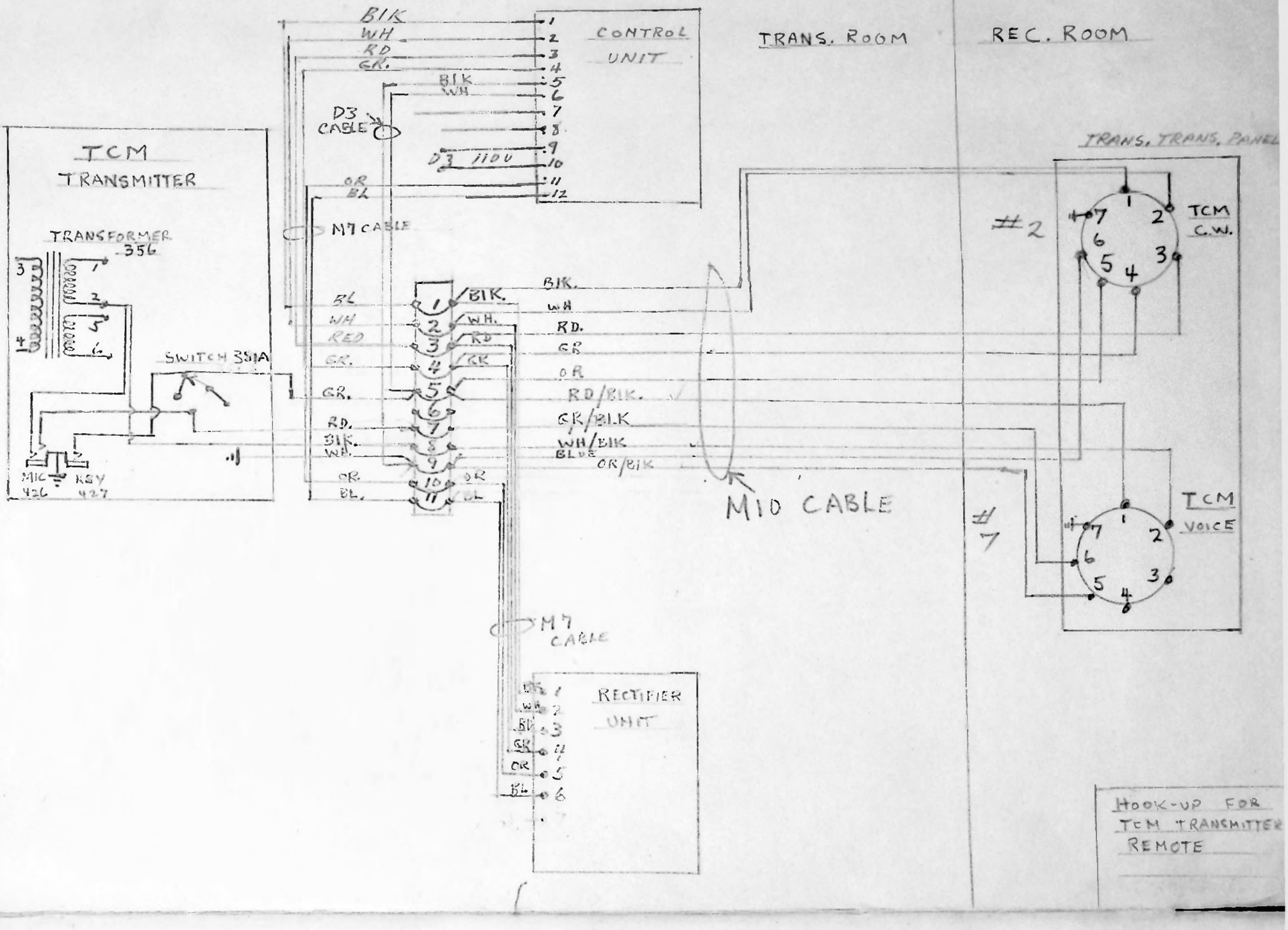
Fig. 8. Typical P-a Tuning, I-f Radio Transmitter, Navy Type CG- 52205



Outline Diagram, H-f Radio Transmitter, Navy Type CG-52206

REV. 2

RESTRICTED
P-7763469



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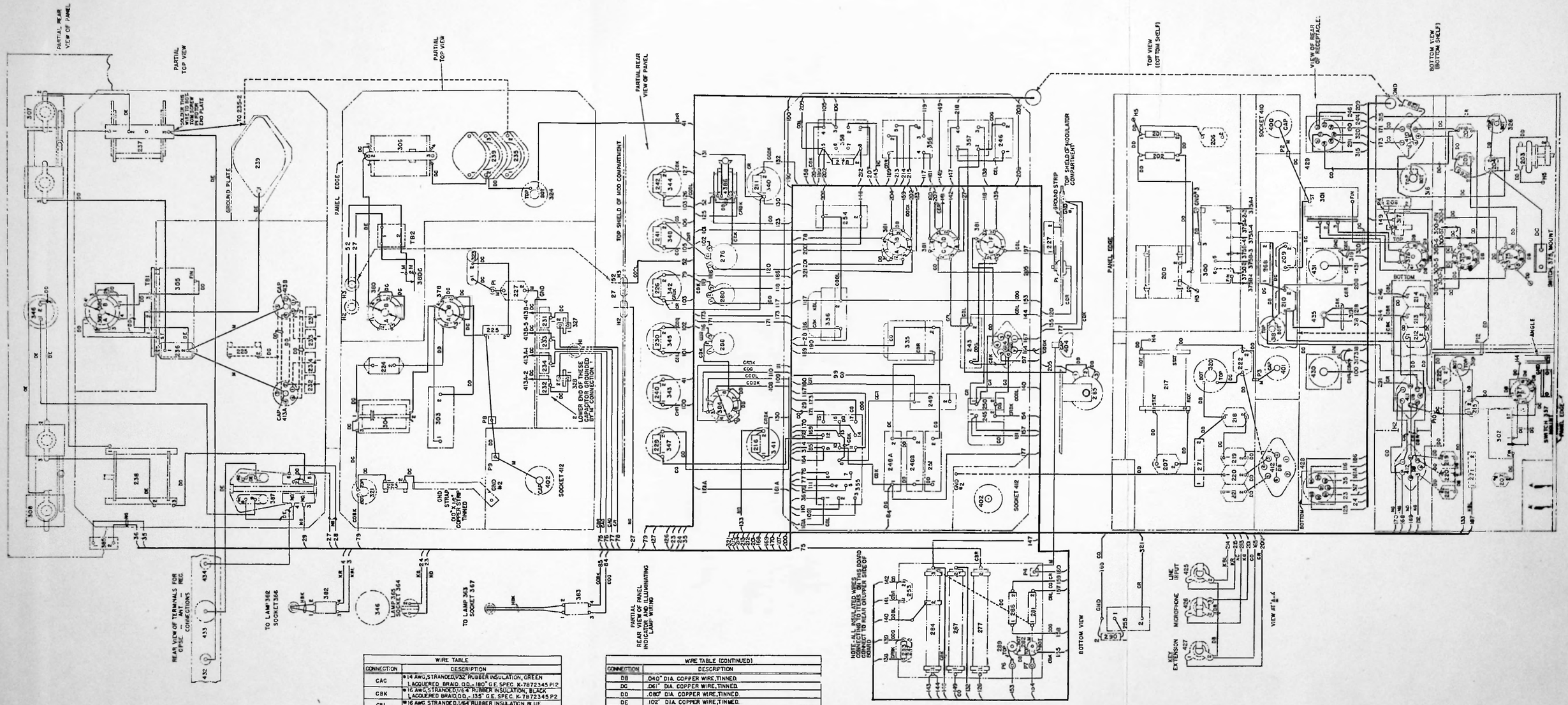
P-7763469



WIRE TABLE	
CONNECTION	DESCRIPTION
CAG	#14 AWG, STRANDED, V32 RUBBER INSULATION, GREEN LACQUERED BRAID, O.D. - 180" G.E. SPEC. K-7872345 P12
CBK	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, BLACK LACQUERED BRAID, O.D. - 135" G.E. SPEC. K-7872345 P2
CBL	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, BLUE LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P6
CBR	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, BROWN LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P3
CG	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, GREEN LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P5
CHR	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, RED LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P11
CO	#16 AWG, STRANDED, 1/64 RUBBER INSULATION ORANGE LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P1
COBK	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, ORANGE/BLACK LACQUERED BRAID, O.D. - 135" G.E. SPEC. K-7872345 P7
COBL	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, ORANGE/BLUE LACQUERED BRAID, O.D. - 135" G.E. SPEC. K-7872345 P9
COG	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, ORANGE/GREEN LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P10
CR	#16 AWG, STRANDED, 1/64 RUBBER INSULATION RED LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P4
CRBK	#16 AWG, STRANDED, 1/64 RUBBER INSULATION, RED/BLACK LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P8

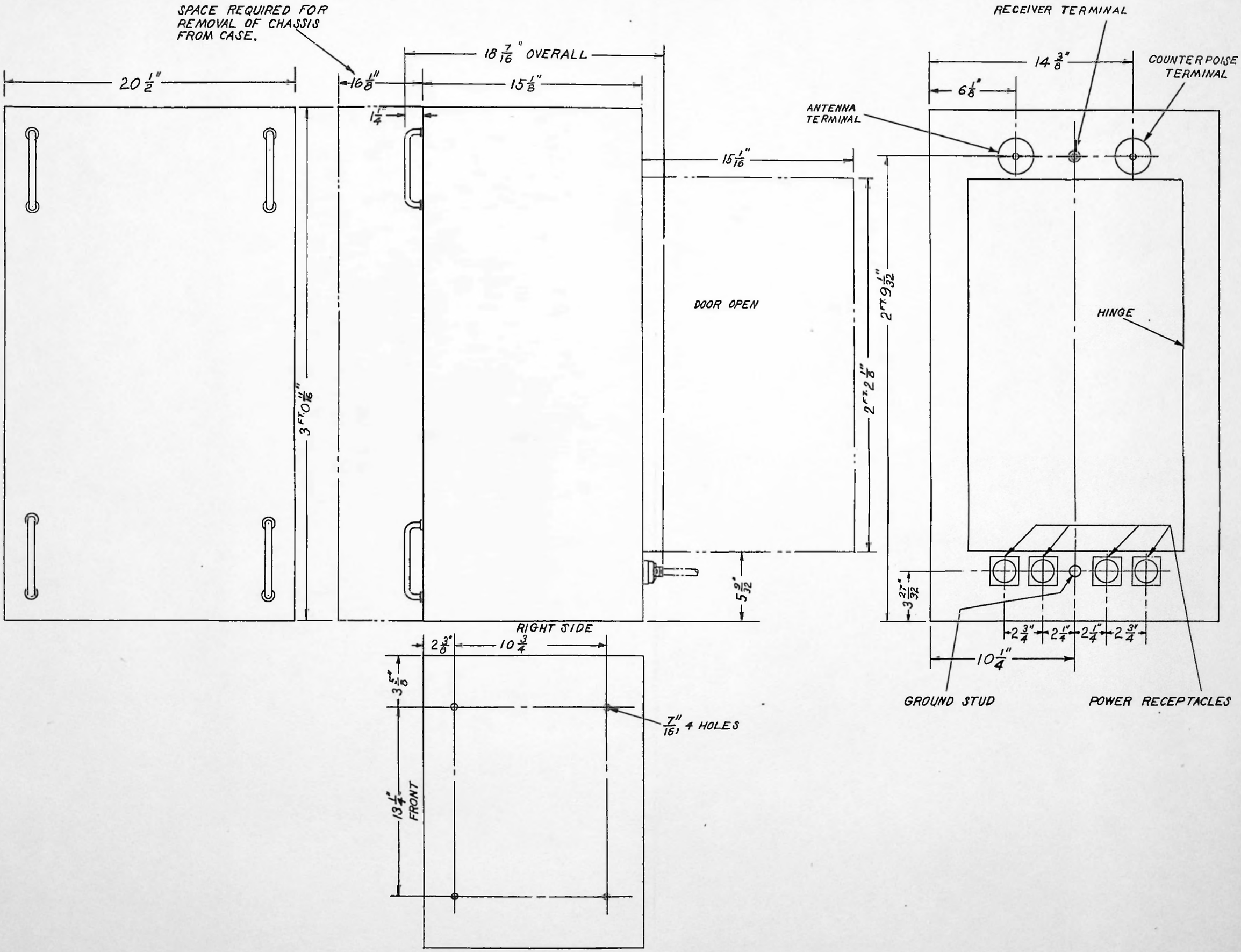
WIRE TABLE (CONTINUED)	
CONNECTION	DESCRIPTION
DB	.040" DIA. COPPER WIRE, TINNED.
DC	.061" DIA. COPPER WIRE, TINNED.
DD	.080" DIA. COPPER WIRE, TINNED.
DE	.102" DIA. COPPER WIRE, TINNED.
HBK	#22 AWG. CELLULOSE ACETATE BRAID, WHITE WITH BLACK TRACER, G.E. SPEC. K-7875044 P2
KBL	#22 AWG. STRANDED, BLUE TINNED COPPER BRAID SHIELD, O.D. - 160" G.E. SPEC. K-7875099 P3
KG	#22 AWG. STRANDED, GREEN, TINNED COPPER BRAID SHIELD, O.D. - 160" GE. SPEC. K-7875099 P2
KO	#22 AWG. STRANDED, ORANGE, TINNED COPPER BRAID SHIELD, O.D. - 160" G.E. SPEC. K-7875099 P1
KR	#22 AWG, STRANDED, RED, TINNED COPPER BRAID SHIELD O.D. - 160" G.E. SPEC. K-7875099
LRBL	#20 AWG, SOLID, TWO CONDUCTOR TWISTED, ONE RED AND ONE BLUE, TINNED COPPER BRAID OVERALL, O.D. - 215" GE. SPEC. K-7875100 P1
NG	#16 AWG, STRANDED, GREEN, TINNED COPPER BRAID SHIELD O.D. - 155" GE. SPEC. K-7876933 P1
W OR UNMARKED	UNIT PIECE OF APPARATUS

Rev. 1

Connection Diagram, H-f Radio Transmitter, Navy Type CG-52206

RESTRICTED

W-7351920

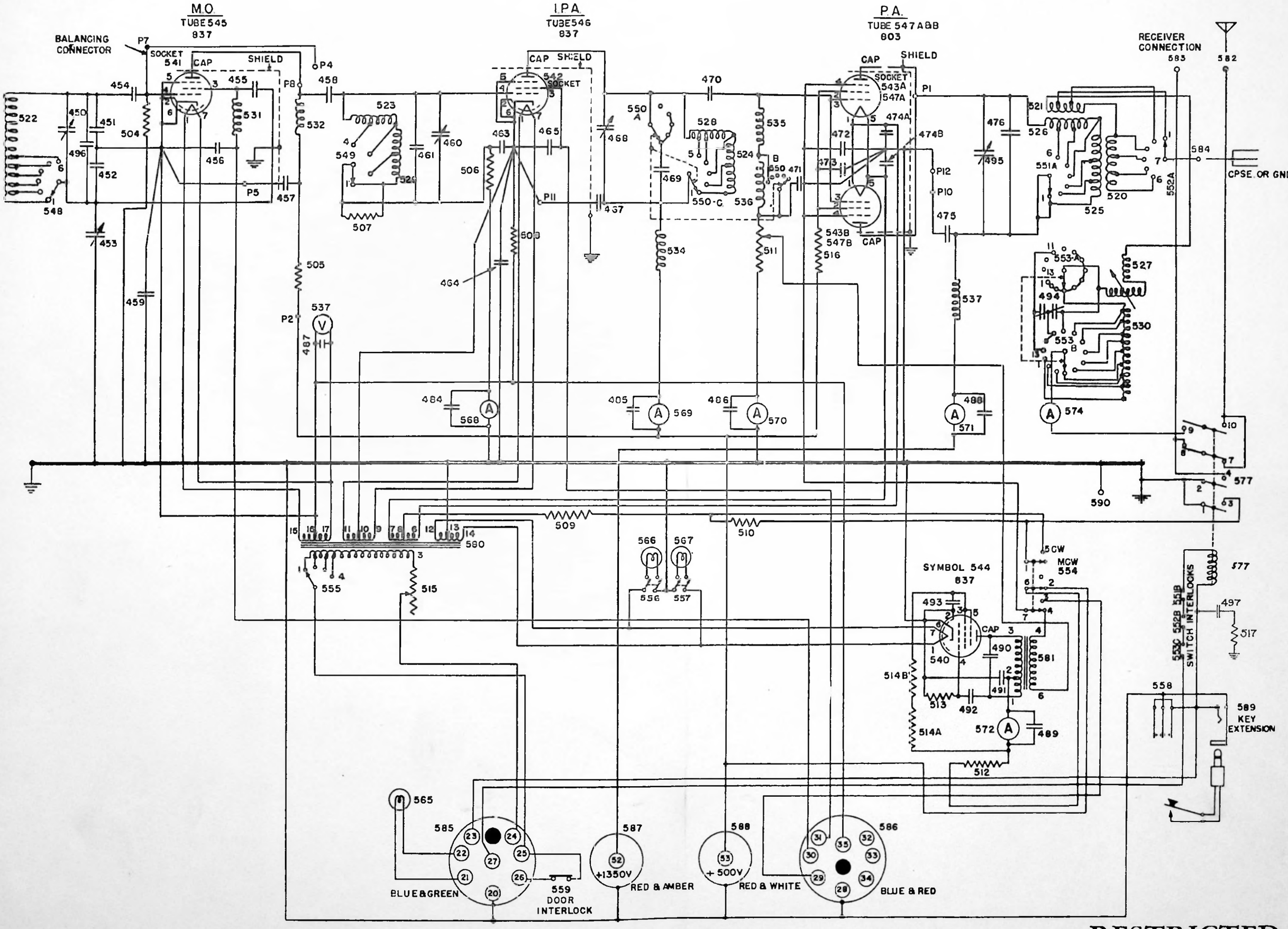


Outline Diagram, I-f Radio Transmitter, Navy Type CG-52205

RESTRICTED

P-7763470

REV. 2

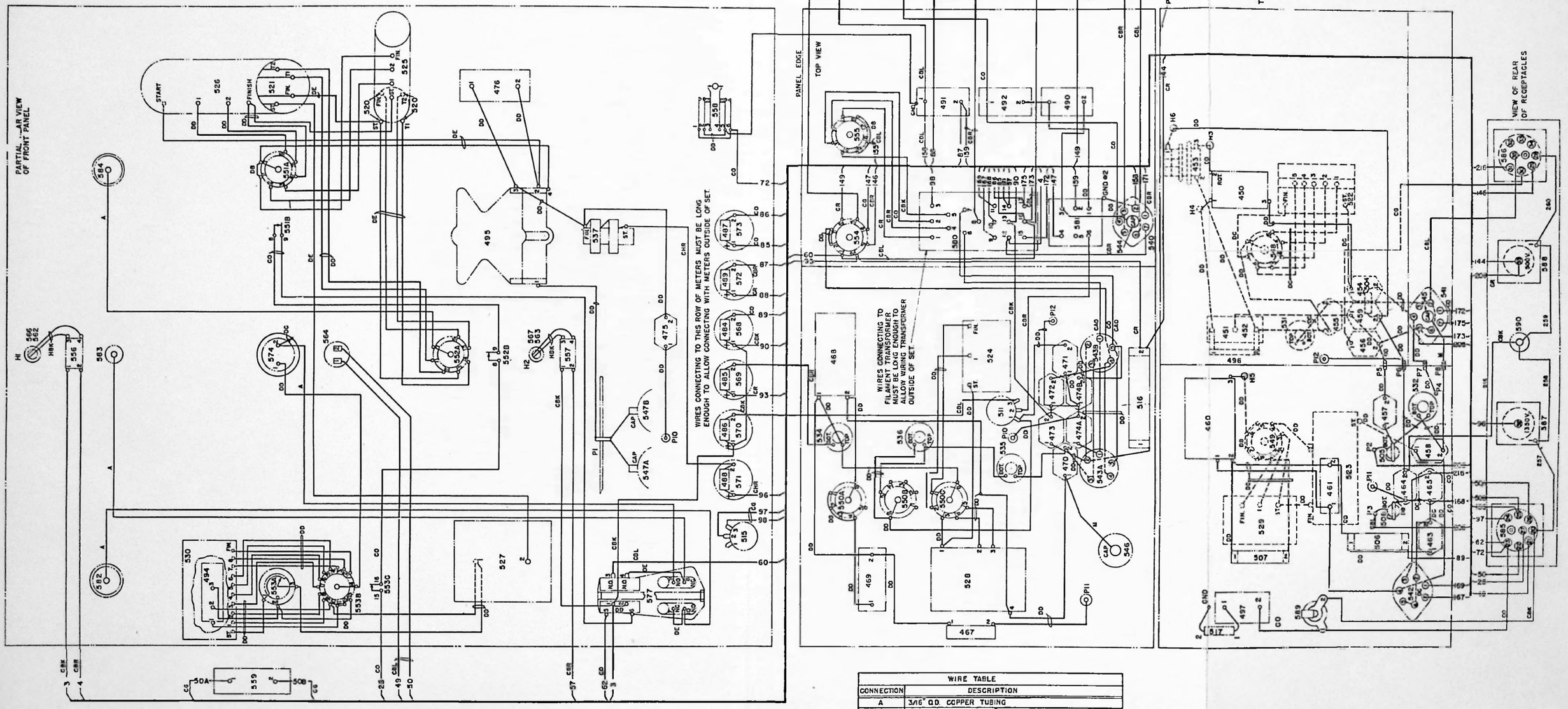


Schematic Diagram, I-f Radio Transmitter, Navy Type CG-52205

REV. 0

RESTRICTED

W-7351923


PARTIAL AIR VIEW OF FRONT PANEL
WIRES CONNECTING TO THIS ROW OF METERS MUST BE LONG ENOUGH TO ALLOW CONNECTING WITH METERS OUTSIDE OF SET
WIRES CONNECTING TO FILAMENT TRANSFORMER MUST BE LONG ENOUGH TO ALLOW WIRING TRANSFORMER OUTSIDE OF SET
PANEL EDGE
TOP VIEW
VIEW OF REAR OF RECEPTACLES
START
FINISH
30A
50B

WIRE TABLE	
CONNECTION	DESCRIPTION
A	3/16" O.D. COPPER TUBING
CAO	#14 AWG, STRANDED, 1/32" RUBBER INSULATION, ORANGE LACQUERED BRAID, O.D. -180" G.E. SPEC. K-7872345 PI3
CBK	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, BLACK LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P2
CBL	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, BLUE LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P6
CBR	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, BROWN LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P3
CG	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, GREEN LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P5
CHR	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, RED LACQUERED BRAID, O.D. -200" G.E. SPEC. K-7872345 PII
CO	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, ORANGE LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 PI
CR	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, RED LACQUERED BRAID, O.D. -135" G.E. SPEC. K-7872345 P4
DB	.040" DIA. COPPER WIRE TINNED
DC	.063" DIA. COPPER WIRE TINNED
DD	.080" DIA. COPPER WIRE TINNED
DE	.102" DIA. COPPER WIRE TINNED
HBK	#22 AWG, CELLULOSE ACETATE BRAID INSULATION, WHITE WITH BLACK TRACER G.E. SPEC. K-7875044 P2
"M" OR UNMARKED	UNIT PIECE OF APPARATUS

Connection Diagram, I-f Radio Transmitter, Navy Type CG-52205

Rev. 1

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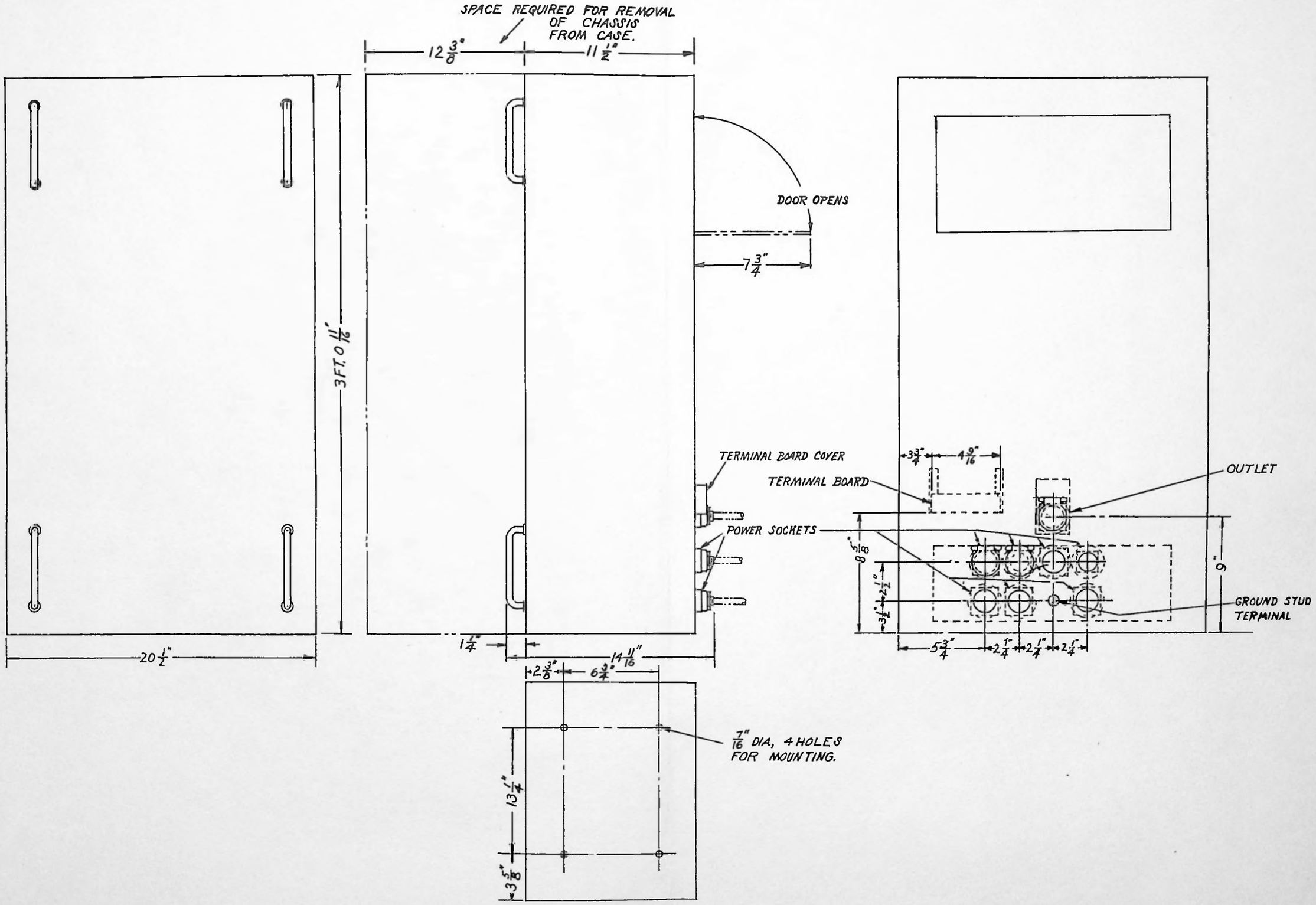
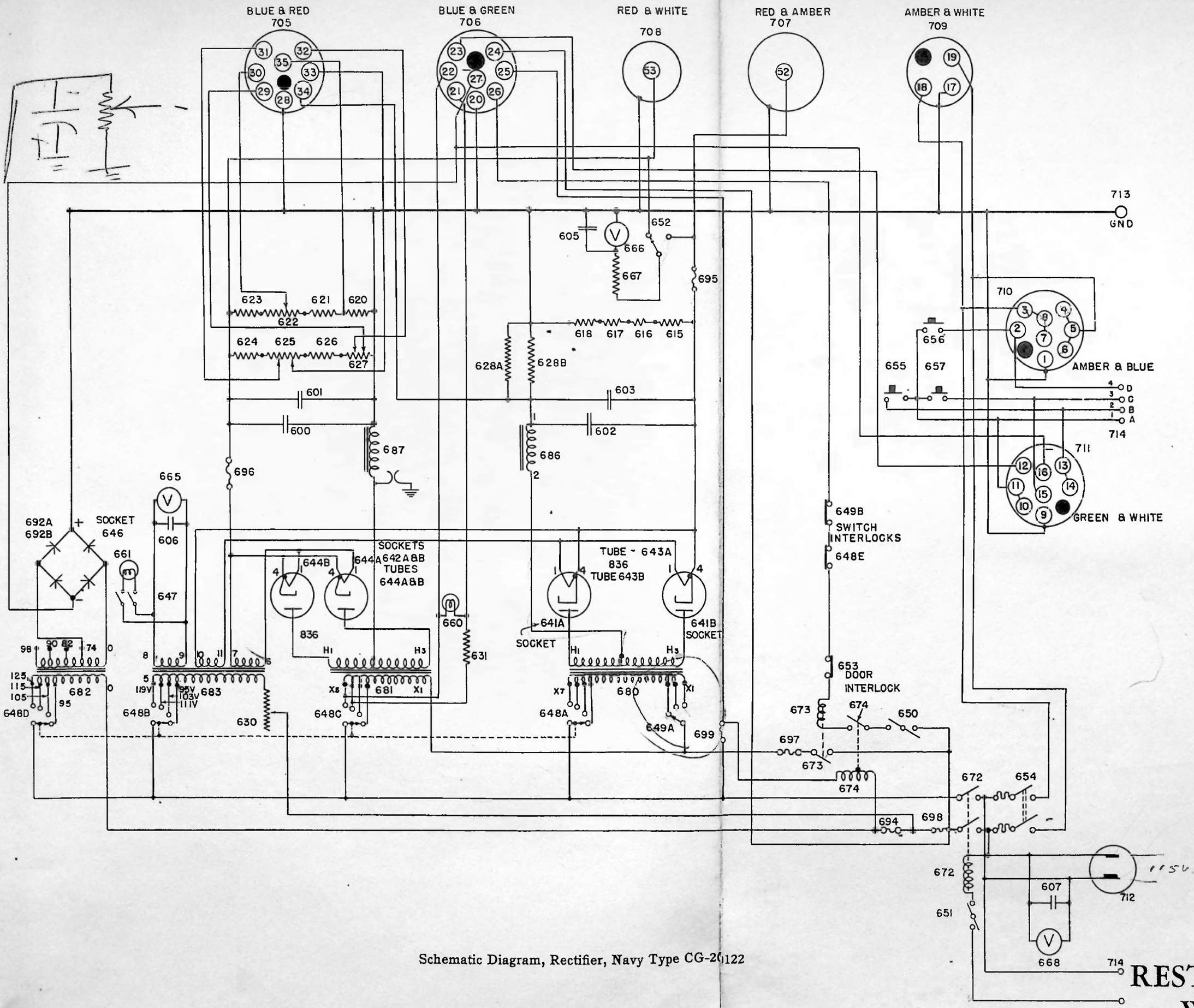
W-7351921



Outline Diagram, Rectifier, Navy Type CG-20122

REV. 1

RESTRICTED
P-7763466



Schematic Diagram, Rectifier, Navy Type CG-20122

RESTRICTED

W-7351922

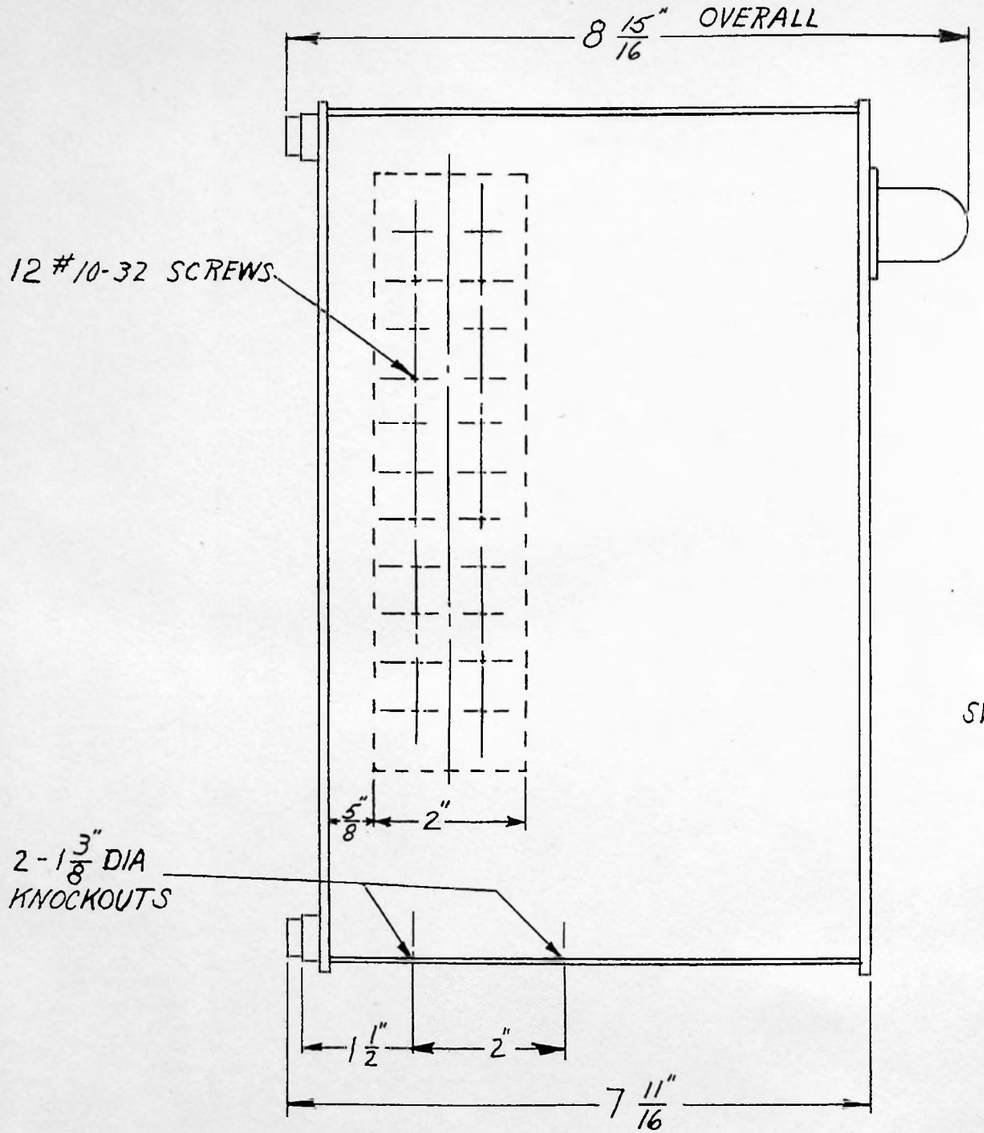
REV. 0

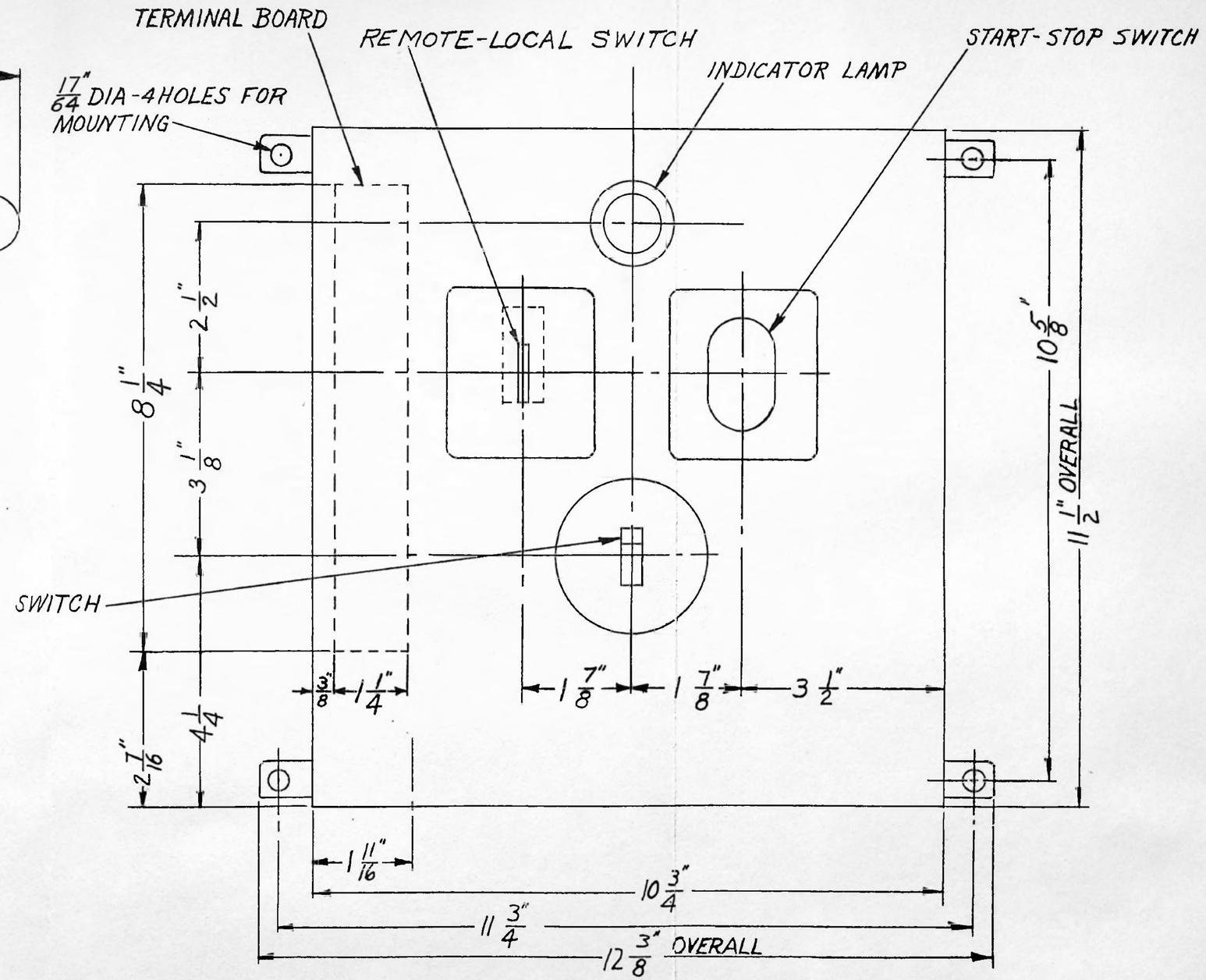
WIRE TABLE	
CONNECTION	DESCRIPTION
CABR	#14 AWG, STRANDED, 1/32" RUBBER INSULATION, BROWN LACQUERED BRAID, O.D. - .180" G.E. SPEC. K-7872345 P14
CAG	#14 AWG, STRANDED, 1/32" RUBBER INSULATION, GREEN LACQUERED BRAID, O.D. - .180" G.E. SPEC. K-7872345 P12
CAO	#14 AWG, STRANDED, 1/32" RUBBER INSULATION, ORANGE LACQUERED BRAID, O.D. - .180" G.E. SPEC. K-7872345 P13
CBK	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, BLACK LACQUERED BRAID, O.D. - .135" G.E. SPEC. K-7872345 P2
CBL	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, BLUE LACQUERED BRAID, O.D. - .135" G.E. SPEC. K-7872345 P6
CBR	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, BROWN LACQUERED BRAID, O.D. - .135" G.E. SPEC. K-7872345 P3
CG	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, GREEN LACQUERED BRAID, O.D. - .135" G.E. SPEC. K-7872345 P5
CHR	#16 AWG, STRANDED, 3/64" RUBBER INSULATION, RED LACQUERED BRAID, O.D. - .200" G.E. SPEC. K-7872345 P11
CHRB	#14 AWG, STRANDED, 3/64" RUBBER INSULATION, RED/BLACK LACQUERED BRAID, O.D. - .211" G.E. SPEC. K-7872345 P15
CO	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, ORANGE LACQUERED BRAID, O.D. - .135" G.E. SPEC. K-7872345 P1
CR	#16 AWG, STRANDED, 1/64" RUBBER INSULATION, RED LACQUERED BRAID, O.D. - .135" G.E. SPEC. K-7872345 P4
HBK	#22 AWG, STRANDED, CELLULOSE ACETATE BRAID, WHITE WITH BLACK TRACER G.E. SPEC. K-7875044 P2
DC	.063" DIA. COPPER WIRE TINNED
DD	.080" DIA. COPPER WIRE TINNED
"M" OR UNMARKED	UNIT PIECE OF APPARATUS

Connection Diagram, Rectifier, Navy Type CG-20122

RESTRICTED
W-7351919

Rev. 1



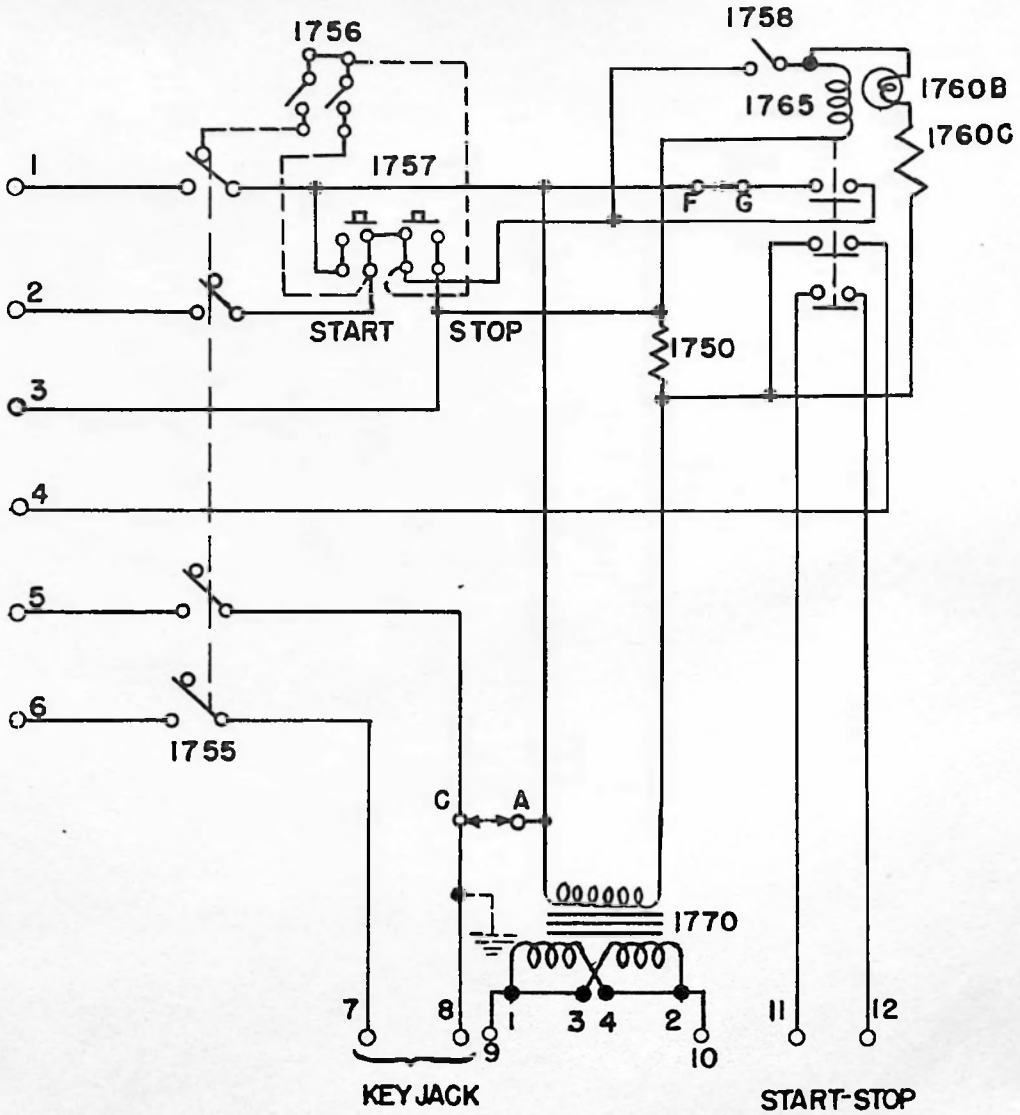


Outline Diagram, Control Unit, Navy Type CG-23241

REV. 1

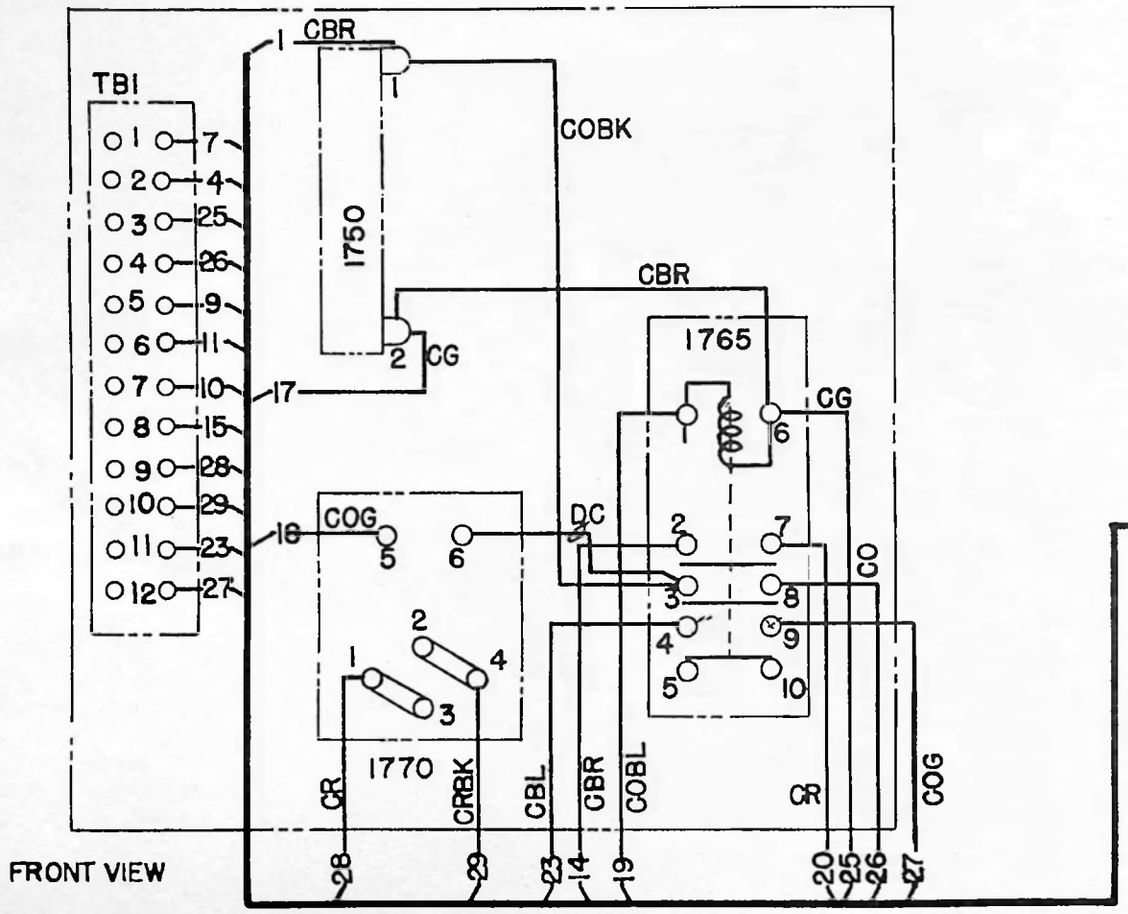
RESTRICTED

M-7465454

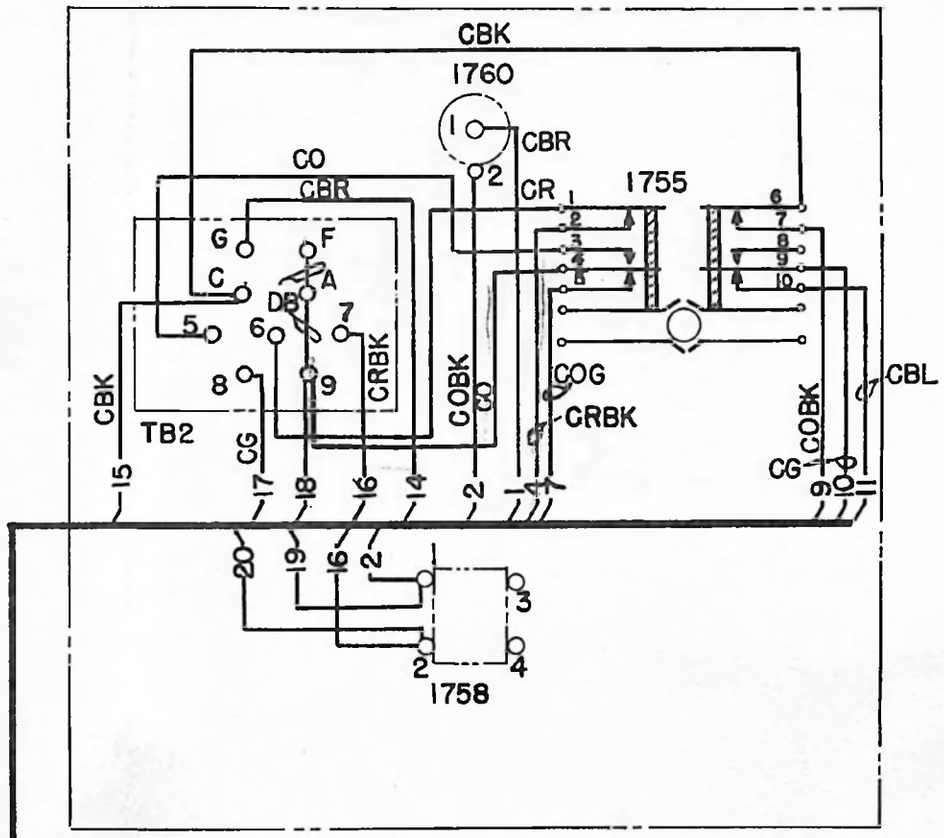


Schematic Diagram, Control Unit Navy Type CG-23241

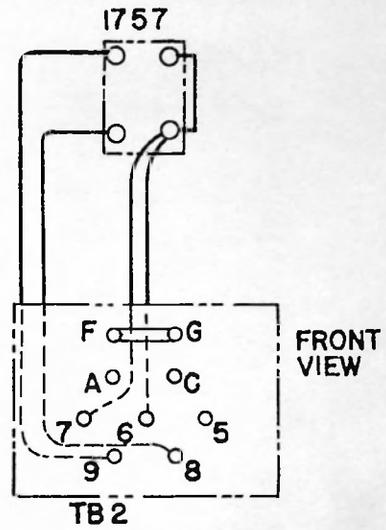
NOTE: LINKS ON TRANSFORMER 1770 SHOWN
FOR 110 VOLTS A.C.
FOR 220 VOLTS REMOVE LINKS 1-3
AND 2-4 AND CONNECT LINKS 2-3



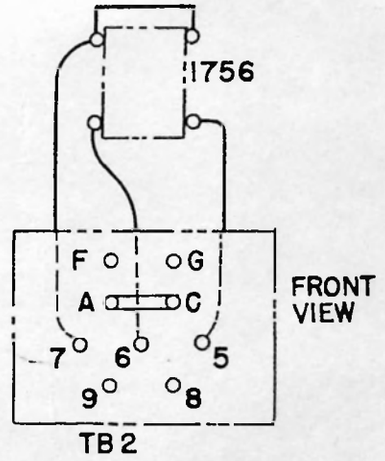
FRONT VIEW



REAR VIEW



FOR 6 WIRE CONTROL
CONNECT SWITCH 1757
TO TB2 AS SHOWN
LINK ON F-G



FOR 4 WIRE CONTROL
CONNECT SWITCH 1756 TO
TB2 AS SHOWN.
LINK ON A-C

CODED WIRE C ( ) *	#16 AWG, 1/64" RUBBER INSULATION, COLORED LACQUERED BRAID, O.D. -.135" G.E. SPEC. K-7872345
DB	.040" DIA. COPPER WIRE TINNED
DC	.064" DIA. COPPER WIRE TINNED

DRAWING REFERENCE	
SCHEMATIC DIAGRAM	K-7877856

( ) *

R-RED
O-ORANGE
BR-BROWN
BK-BLACK
BL-BLUE
G-GREEN
OBL-ORANGE/BLUE
RBK-RED/BLACK
OBK-ORANGE/BLACK
OG-ORANGE/GREEN

Connection Diagram, Control Unit, Navy Type CG-23241

REV. 3

RESTRICTED
M-7465549

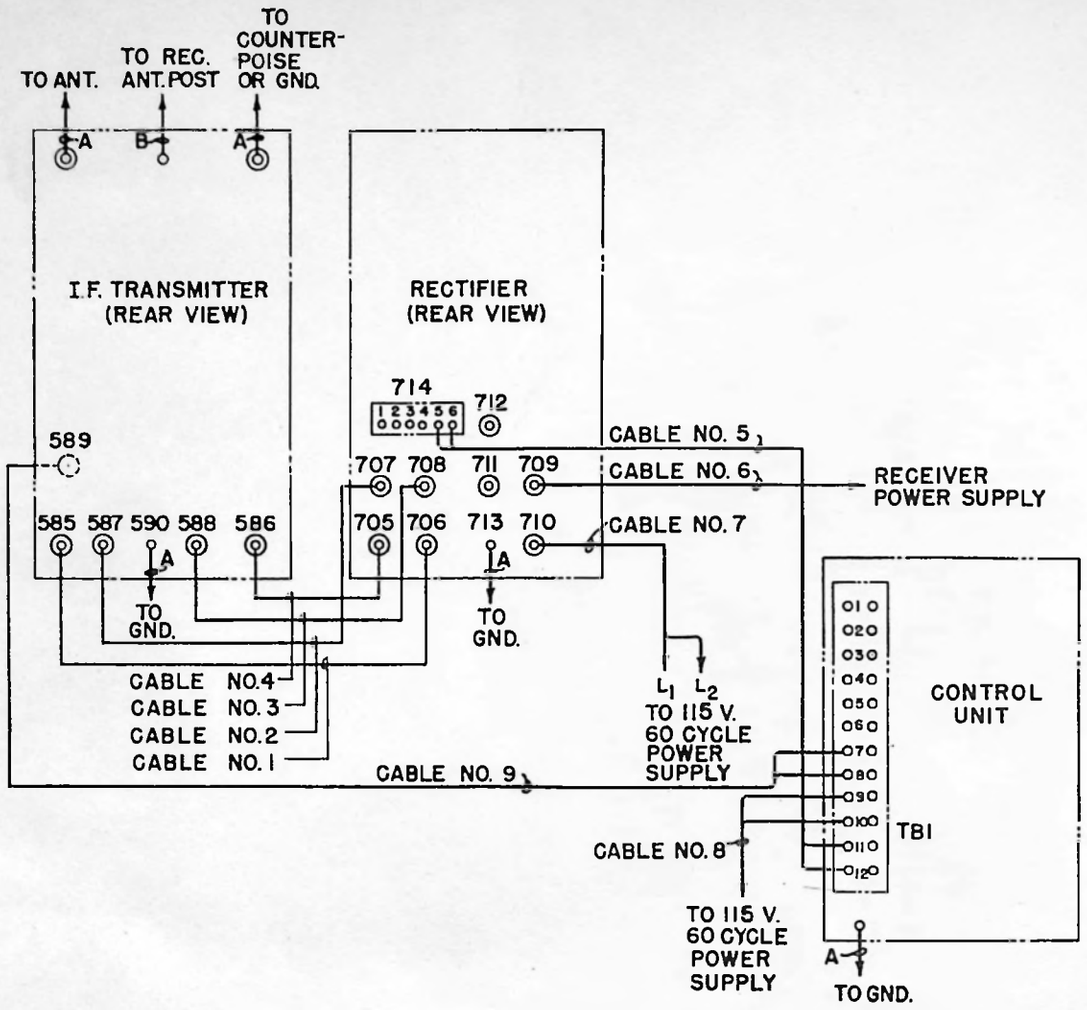


FIG. 1

FIG. 2

FIG. 3

FIG. 4

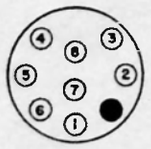


FIG. 5

709

FIG. 6

RECEIVER PLUG

FIG. 7

PLUGS AS VIEWED FROM CONNECTION END

COLOR CODE	CABLE NO.	G.E. CABLE REFERENCE	EQUIV. CABLE NAVY 15C1	CONNECTIONS FROM	CONNECTIONS TO	PLUG	REMARKS
				I.F. TRANSM.	RECTIFIER		
BLUE & GREEN	1	1306 ML-7660386 G7	MCS-7	585-27 585-21 585-22 585-23 585-24 585-25 585-26	706-27 706-21 706-22 706-23 706-24 706-25 706-26	SEE FIG. 1	EACH CONDUCTOR SHALL BE #16 AWG WITH AT LEAST 1/32" 40% COLORED RUBBER INSULATION.
RED & AMBER	2	1309 ML-7660386G11	NONE	587-52	707-52	SEE FIG. 2	EACH CONDUCTOR #14 AWG, 5/64" OF R-344-40% RUBBER
RED & WHITE	3	1308 ML-7660386G12	NONE	588-53	708-53	SEE FIG. 3	SAME AS FOR CABLE NO. 2
BLUE & RED	4	1307 ML-7660386G8	MCS-7	586-29 586-30 586-31 586-32 586-33 586-34 586-35	705-29 705-30 705-31 705-32 705-33 705-34 705-35	SEE FIG. 4	SAME AS FOR CABLE NO. 1
				RECTIFIER	CONTROL UNIT		
	5	S-392382-1-E1	SRLL-4	714-5 714-6	TBI-11 TBI-12		#14 AWG - LOW TENSION - LEADED
				RECTIFIER	RECEIVER PLUG		
	6	K-7871913 P2	MCS-2	709-18 709-19	PIN 2 PIN 3 CONNECT SHIELD TO PIN NO. 1	SEE FIG. 6 & FIG. 7	EACH CONDUCTOR SHALL BE #16 AWG INSULATED WITH AT LEAST 2/64" COLORED 40% RUBBER
				RECTIFIER	115 V. 60 CYCLE POWER SUPPLY		
BLUE & AMBER	7	1305 ML-7660386 G5	MCS-7	710-3 710-7 710-8 710-4 710-5 710-6	L1 L2	SEE FIG 5	SAME AS FOR CABLE NO. 1
				CONTROL UNIT	115 V. 60 CYCLE POWER SUPPLY		
	8	S-392382-1-E1	SRLL-4	TBI-9 TBI-10	L1 L2		SAME AS FOR CABLE NO. 5
				I.F. TRANSM.	CONTROL UNIT		
	9		MCS-2	589-TIP 589-SLEEVE	TBI-7 TBI-8		#18 AWG, STRANDED, 2 CONDUCTOR FLEXIBLE RUBBER CORD. O.D. - 9/32

A - AT LEAST #12 AWG BARE COPPER WIRE
NOTE: LEADS FROM ANT. POST MUST BE SUPPORTED ON INSULATORS AT LEAST 6 INCHES AWAY FROM ALL METALLIC SURFACES.

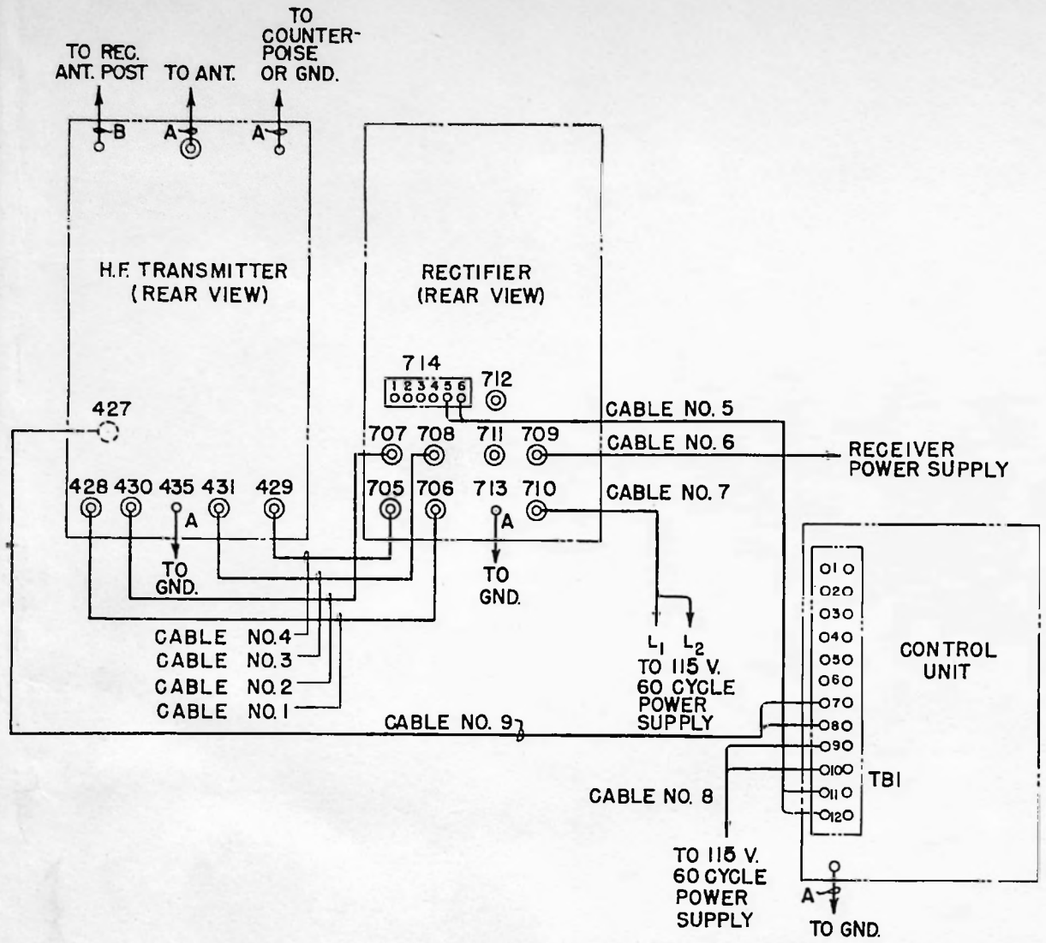
B #16 AWG, 2/64" RUBBER INSULATION
NOTE: CAPACITY OF THIS CONDUCTOR TO GROUND MUST BE KEPT LOW BY SUPPORTING THIS CONDUCTOR ON INSULATORS AT LEAST 3 INCHES AWAY FROM ALL METALLIC WALLS AND SURFACES.

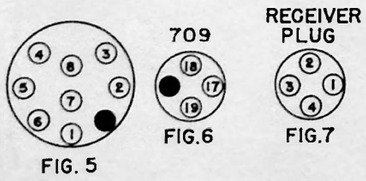
RESTRICTED

External Connection Diagram, Navy Model TCU-2 Radio Transmitting Equipment

REV. 2

P-7764057



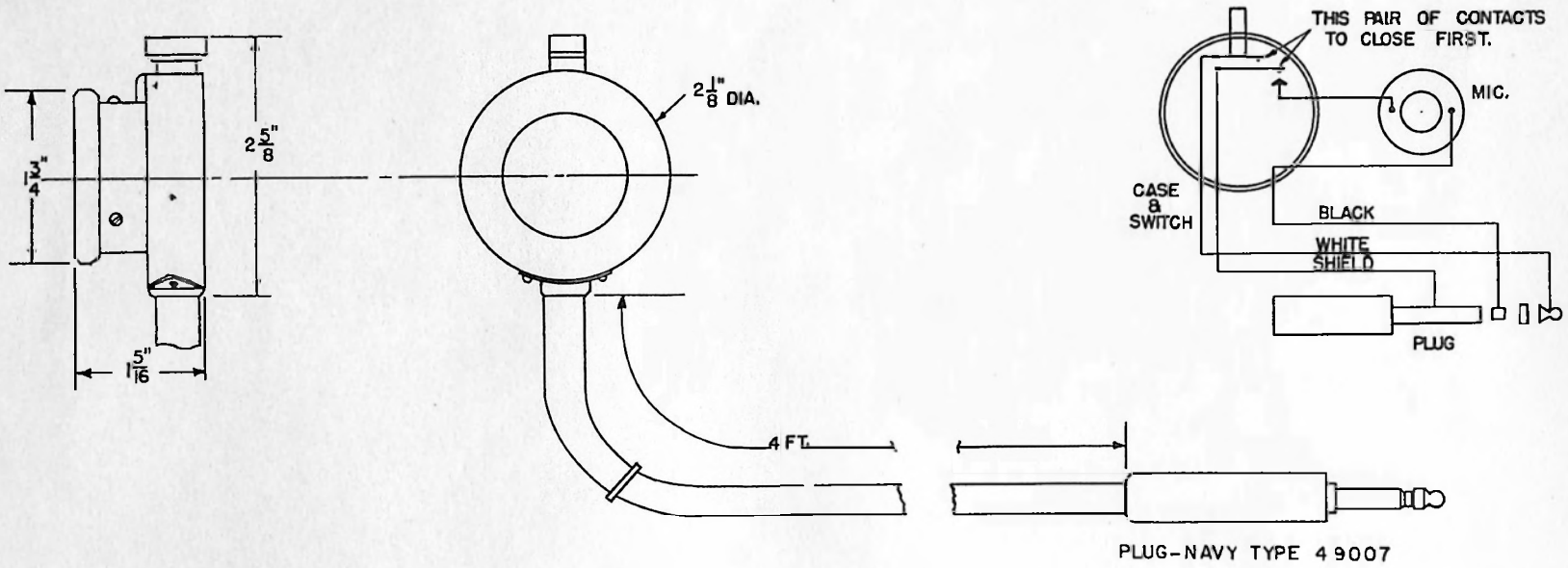


PLUGS AS VIEWED FROM CONNECTION END

COLOR CODE	CABLE NO.	G.E. CABLE REFERENCE	EQUIV. CABLE NAVY 15C1	CONNECTIONS FROM	CONNECTIONS TO	PLUG	REMARKS
				H.F. TRANSM.	RECTIFIER		
BLUE & GREEN	1	1306 ML-7660386G7	MCS-7	428-27 428-21 428-22 428-23 428-24 428-25 428-26	706-27 706-21 706-22 706-23 706-24 706-25 706-26	SEE FIG. 1	EACH CONDUCTOR SHALL BE #16 AWG WITH AT LEAST 1/32" 40% COLORED RUBBER INSULATION.
RED & AMBER	2	1309 ML-7660386G11	NONE	430-52	707-52	SEE FIG.2	EACH CONDUCTOR #14 AWG, 5/64" OF R-344-40% RUBBER
RED & WHITE	3	1308 ML-7660386G12	NONE	431-53	708-53	SEE FIG. 3	SAME AS FOR CABLE NO. 2
BLUE & RED	4	1307 ML-7660386 G8	MCS-7	429-29 429-30 429-31 429-32 429-33 429-34 429-35	705-29 705-30 705-31 705-32 705-33 705-34 705-35	SEE FIG. 4	SAME AS FOR CABLE NO. 1
				RECTIFIER	CONTROL UNIT		
	5	S-392382-1-E1	SRLL-4	714-5 714-6	TB1-11 TB1-12		#14 AWG - LOW TENSION - LEADED
				RECTIFIER	RECEIVER PLUG		
	6	K-7871913 P2	MCS-2	709-18 709-19	PIN 2 PIN 3 CONNECT SHIELD TO PIN NO. 1	SEE FIG. 6 & FIG. 7	EACH CONDUCTOR SHALL BE #16 AWG INSULATED WITH AT LEAST 2/64" COLORED 40% RUBBER
				RECTIFIER	115 V. 60 CYCLE POWER SUPPLY		
BLUE & AMBER	7	1305 ML-7660386G5	MCS-7	710-3 710-7 710-8 710-4 710-5 710-6	L1 L2	SEE FIG. 5	SAME AS FOR CABLE NO. 1
				CONTROL UNIT	115 V. 60 CYCLE POWER SUPPLY		
	8	S-392382-1-E1	SRLL-4	TB1-9 TB1-10	L1 L2		SAME AS FOR CABLE NO. 5
				H.F. TRANSM.	CONTROL UNIT		
	9		MCS-2	427-TIP 427-SLEEVE	TB1-7 TB1-8		#18 AWG, STRANDED, 2 CONDUCTOR FLEXIBLE RUBBER CORD. O.D - 9/32"

A - AT LEAST #12 AWG BARE COPPER WIRE
NOTE: LEADS FROM ANT. POST MUST BE SUPPORTED ON INSULATORS AT LEAST 6 INCHES AWAY FROM ALL METALLIC SURFACES.

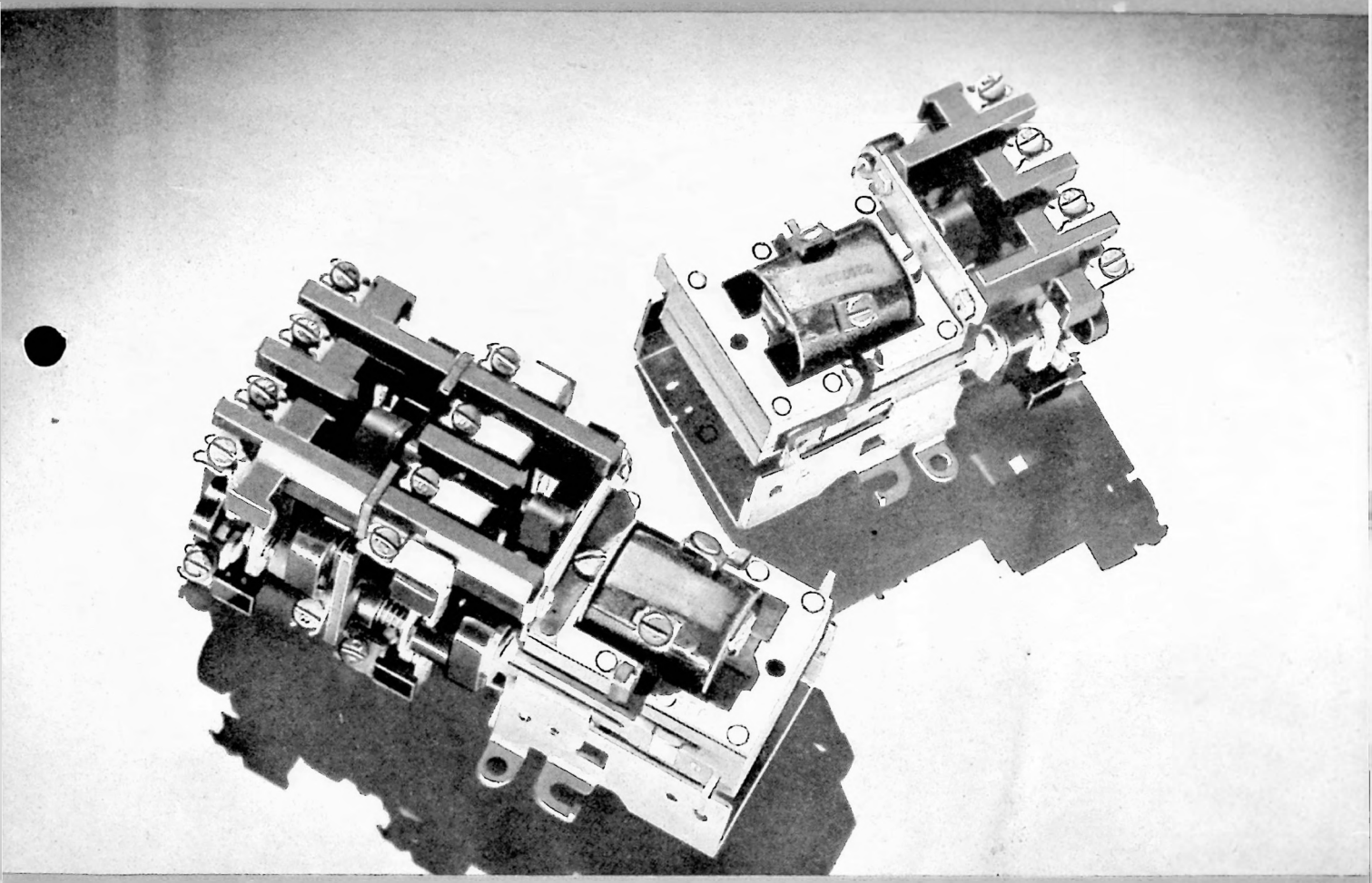
B #16 AWG, 2/64" RUBBER INSULATION
NOTE: CAPACITY OF THIS CONDUCTOR TO GROUND MUST BE KEPT LOW BY SUPPORTING THIS CONDUCTOR ON INSULATORS AT LEAST 3 INCHES AWAY FROM ALL METALLIC WALLS AND SURFACES.



WEIGHT (MICROPHONE, CORD & PLUG)— 7 OZ.
NAVY TYPE NUMBER—CMX 51004C.

Outline and Connection Diagram, Hand Microphone, Navy Type CMX-51004C

THE SIZE 00 A-C CONTACTOR, CR2810



A COMPACT MAGNETIC SWITCH FOR RELAYING CONTROL CIRCUITS AND FOR CONTROLLING SMALL MOTORS

Models from 2 to 8 poles, with any desired combination of normally open and normally closed contacts.

Compact construction obtained without deviating from accepted electrical standards.

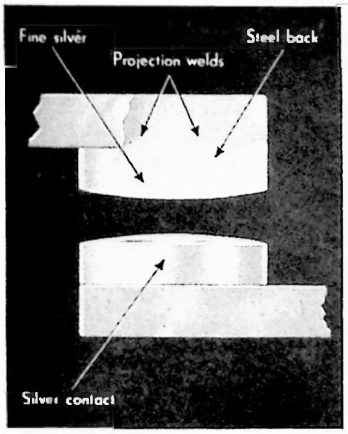
All forms rated 10 amperes at 600 volts.

Contactor designed for quick and easy installation and wiring.

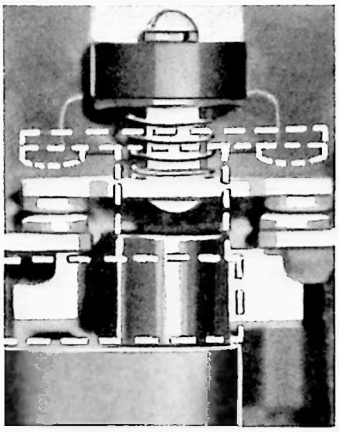
GENERAL ELECTRIC

A FEW OF THE DESIRABLE FEATURES

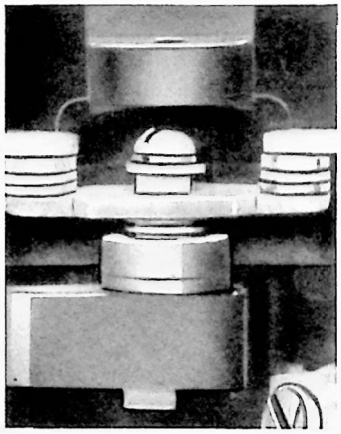
DESIGNED WITH AN EYE TO PERFORMANCE



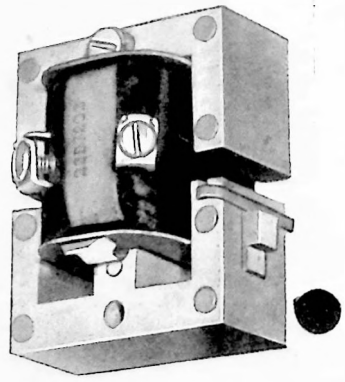
Silver contacts, formed from laminated material attached to support by welded bond so that contacts can't come loose



Positive spring pressure on normally closed contacts prevents rebound common in gravity-closed types

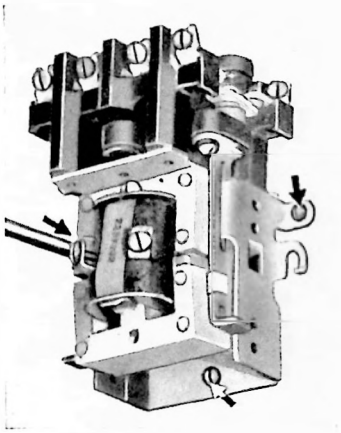


Liberal contact wipe and strong contact springs assure good conduction and quick opening

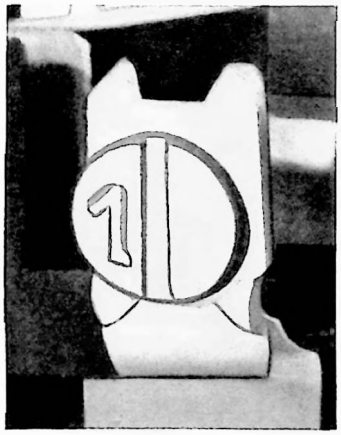


Quiet because of use of pole shader and laminated, silicon-steel, E-shaped magnet

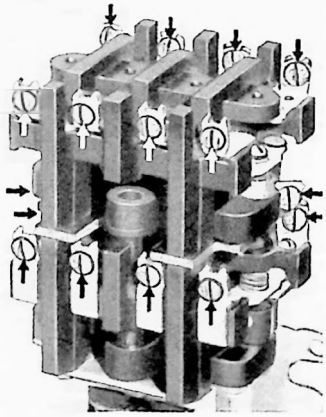
EASILY AND QUICKLY INSTALLED



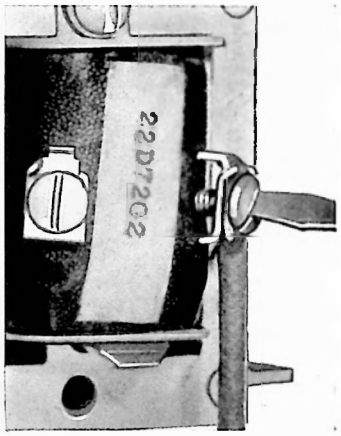
Easy to mount firmly on metal or insulating base by three screws when enclosing case is not used



Numbered terminals clearly identify connections. Large ears assure positive connection

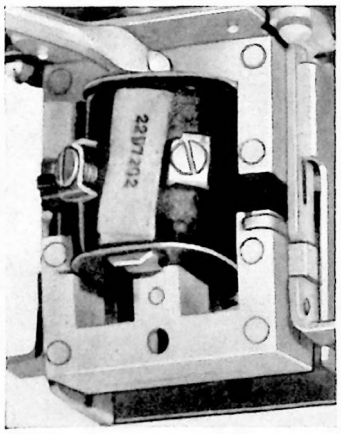


All terminals easily accessible from the front—even the 16 on 8-pole models

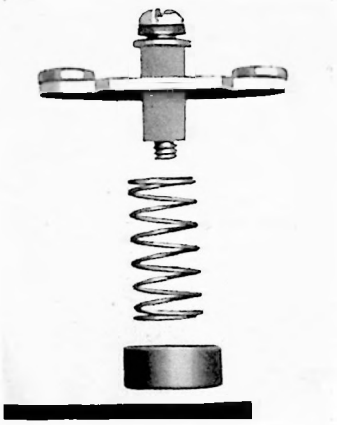


Connections to layer-wound coil made of sturdy, convenient, integrally mounted terminals

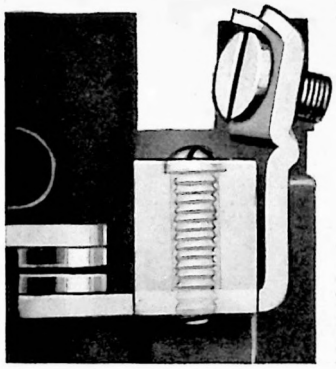
QUICK SUBSTITUTION OR REPLACEMENT OF PARTS



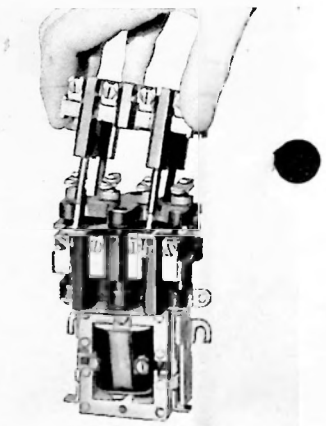
Coils of different ratings easily installed—removing one screw frees the coil-and-magnet assembly



Here's how the movable normally open contacts look when removed. Notice the screw attachment, fiber spring cup, and stainless-steel spring

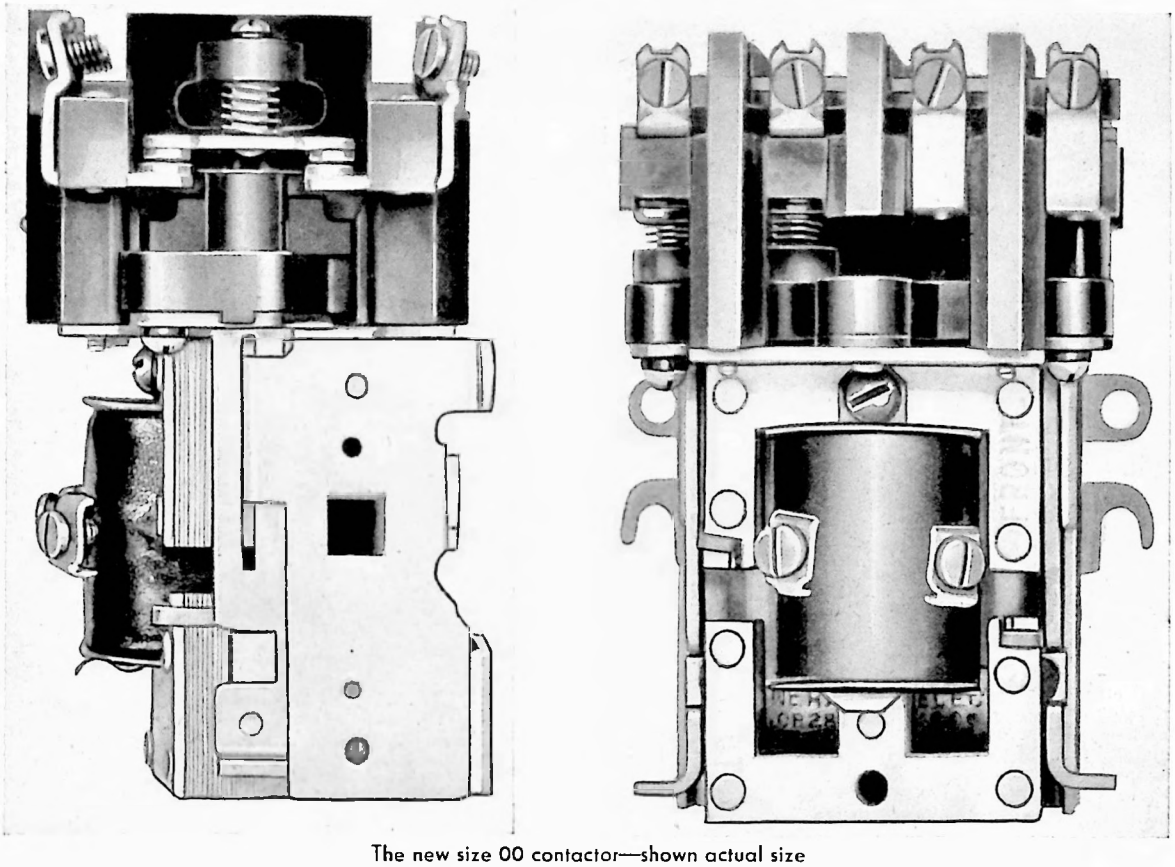


Removable stationary contacts permit replacement or interchange of normally open and normally closed poles



Four-pole switch converted to eight-pole form by addition of a second identical molded head, and a movable-contact support

THE SIZE 00 A-C CONTACTOR, CR2810



The new size 00 contactor—shown actual size

THIS new contactor is particularly suitable for controlling small single-phase and polyphase a-c motors, or for use as a flexible relaying device in comprehensive control systems, such as those on machine tools. It is especially well adapted for this use because it is compactly constructed and is available with any combination of normally open or normally closed contacts in either the 4-pole or the 8-pole form.

The open rating (without enclosure) of this contactor is 10 amperes for a noninductive load, and it can be used on voltages up to 600 volts. As a motor control, it handles single-phase motors rated ½ hp at 110 volts or ¾ hp at 220 volts, and polyphase motors rated ¾ hp at 110 volts or 1 hp at 220 volts or more.

Its smooth action, provided by the efficient magnet and the almost frictionless bearings that give straight-line operation, make possible the high-speed operation that is a major consideration where accurate control is desired, as in machine tools.

How Compactness Is Attained

Each part of this contactor has been carefully designed to be sturdy and to do its job properly, yet all of these parts are combined into a compact clean-cut assembly that has the minimum dimensions in each plane consistent with accepted standards.

The use of fine-silver contacts, an E-shaped magnet providing straight-line action, unit-molded arc barriers and contact supports, and the elimination of all unnecessary parts have all contributed to its compactness.

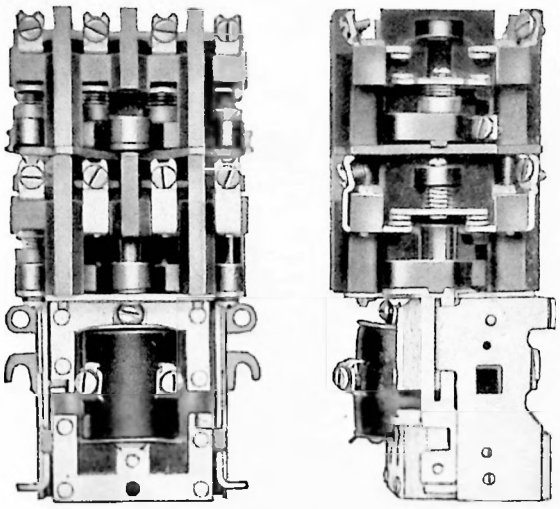
Silver Contacts and Contact Assembly

The laminated fine-silver contacts are stamped and formed from a sheet made by welding an ingot of steel to an ingot of fine silver, and then rolling to proper thickness. A strong steel-to-steel bond is thus formed when the contact is welded to the contact arm. In forming, the silver is drawn down over the steel backing, hence the steel of the tip is never exposed to the arc when the switch opens.

The use of double-break contacts minimizes arcing, increases the interrupting capacity, enables the contactor to withstand severe service, and eliminates troublesome flexible shunts. Fiber cups, fastened to the arm of the movable-tip assembly, protect the stainless steel contact springs and provide ample electrical clearances.

E-shaped Magnet

The straight-line action, provided by the quiet, efficient, E-shaped magnet, contributes greatly to the compactness of this switch. The bronze sliding bearings reduce friction, and hence wear, to the minimum. Another advantage of the E-shaped magnet is its remarkably low power consumption.



The new multipole contactor, showing construction of 5- to 8-pole models (over-all height $5\frac{31}{64}$ inches)

Molded Compound Barriers

The possibility of flashover between poles is minimized by the use of sturdy, hot-molded arc barriers that confine the arc of each phase. This arc-barrier unit not only separates the poles, but forms the head of the contactor supporting the stationary contacts and the connection terminals. It is the use of a small number of well-designed parts, such as this one, that makes possible the small size of this contactor, in spite of its ample rating and excellent performance characteristics.

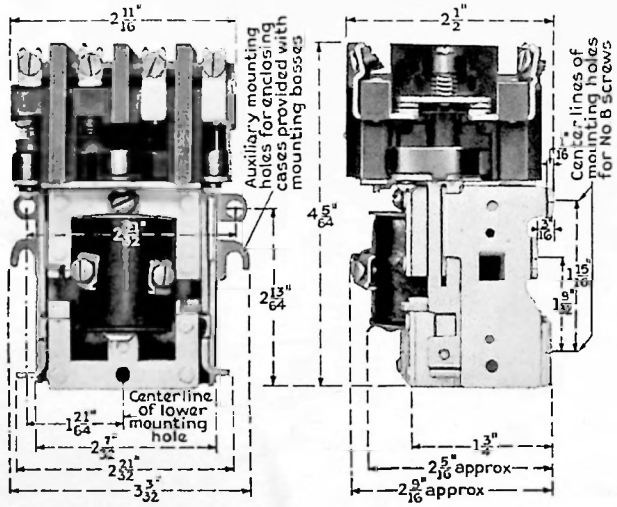
Application and Installation Made Easy

Its compactness and the accessibility of the parts make mounting a simple matter. It can be mounted firmly on either a metal or an insulating base by three screws through readily accessible holes in the frame.

Wiring is likewise easy, for all terminals are accessible and clearly numbered. Coil connections are made to terminals attached to the front of the layer-wound coil.

Since it is possible to obtain contactors having any desired number of normally open or normally closed contacts in either the 4-pole, or the 8-pole form, this switch is well adapted to almost any application that calls for a contactor of this rating.

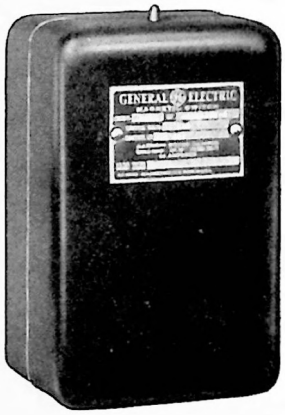
Approximate Dimensions



Maintenance Minimized

This contactor has been designed and built with the purpose of making maintenance virtually unnecessary—long-lived silver contacts, freedom from bearing wear, the layer-wound coil, ample arc barriers, and the rigid frame are all factors in accomplishing this purpose.

However, should maintenance become necessary, the replacement of parts is a relatively simple matter. The entire coil-and-magnet assembly is removed by a single screw. The molded arc-barrier head is easily taken off by removing four screws in the top. The stationary contacts are replaceable without any disassembly.



Typical Enclosing case for Size 00 magnetic switch

Furthermore, since the parts in these Size 00 contactors are well standardized, a small stock of renewal parts will not only provide for complete maintenance of all these contactors, but will permit alteration of contact arrangement to suit different applications.

Enclosure

Normally, this contactor is provided without enclosure, for open mounting or mounting within a machine. However, it is also obtainable in a pressed-steel case for wall mounting, or with a slip cover which may be used when the switch is mounted on an insulated panel. Though the metal enclosing case is not dust-tight, it protects against light dust and light indirect splashing. The cover is held in place by pins, and is easily removable for wiring or inspection.

The round-cornered style of the case gives the unit a neat appearance. The durable, black finish can be covered with paint to match that on the machine or wall, if desired.

GENERAL ELECTRIC

SCHENECTADY, N. Y.

9-43 (7500)
Filing No. 8900

INSTRUCTIONS

CR2820-1099
A-C MOTOR-OPERATED DEFINITE-TIME RELAY

GENERAL ELECTRIC
SCHENECTADY, N.Y.

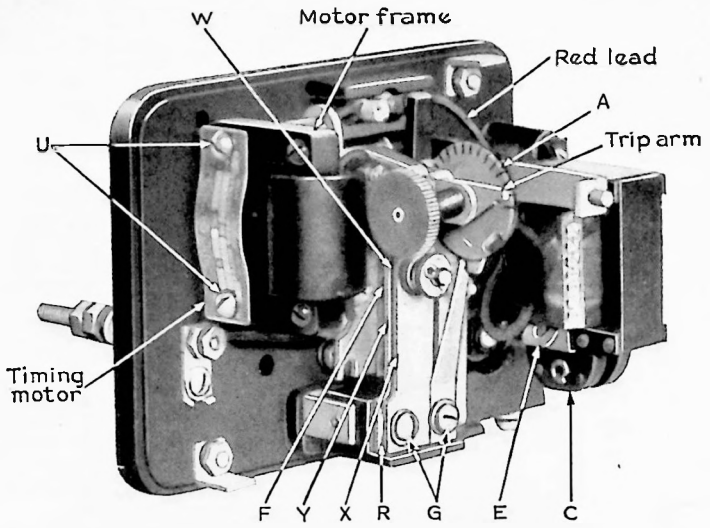


Fig. 1. CR2820-1099 Relay with Cover Removed

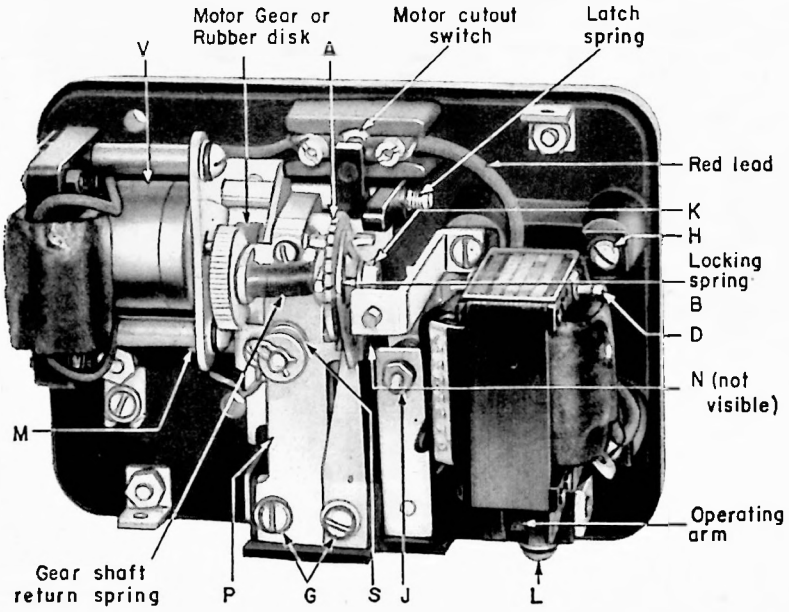


Fig. 2. Another View of Relay Shown in Fig. 1

CR2820-1099
A-C MOTOR-OPERATED DEFINITE-TIME RELAY

Operation

The CR2820-1099 time-delay relay is driven by a synchronous motor suitable for use on alternating current only. When the relay is energized, the solenoid engages the motor with the contact-operating mechanism; a tap on the solenoid provides the correct voltage for the motor. After the predetermined time interval has elapsed, the normally open contact (TC) closes, the normally closed contact (TO) opens (See Fig. 3 and 4), and the motor cutout switch (TO) disconnects the motor. The contacts remain in the timed-out position until the relay is de-energized, at which time the solenoid drops out and the contacts are reset instantly to their original position.

An interlock contact (J), Fig. 2, is provided to establish a holding circuit when the relay is energized from a momentary-contact push button as shown in Fig. 3. This contact is normally open, and closes when the solenoid is energized.

The time setting may be adjusted by releasing the locking spring (B) and turning the calibrating dial (A) until the locking spring is dropped into the slot marked with the desired time. The dial is calibrated either in seconds or in minutes, depending on the maximum time obtainable.

Certain relays (such as the CR2820-1099-P, -Q, -R, and -S) have a metal driving gear on the motor shaft, while others (including the CR2820-1099-AB, -AC, -AD, -AE, -AH, -AJ, and -AP) have a rubber disk on the motor shaft which drives by friction the metal gear on the calibrating unit assembly.

Replacing Solenoid or Coil

The solenoid consists of a frame, a plunger, a coil and two springs.

First, it is necessary to remove the four screws (H) and remove the solenoid and plunger from the base. This frees the plunger from the operating arm and the plunger (C) may then be removed. Then take out cotter pin (D) and springs (E). The coil may then be removed.

Before reassembling the solenoid the sealing surfaces should be cleaned (that is, the upper end of the plunger and the surface of the frame against which the plunger seats). The color-coded coil leads should be connected as shown in Fig. 4.

Maintenance of Relay

The silver contacts should not require any attention until the silver has worn almost completely away. To replace the interlock contacts remove screw (J). The movable contact and spring may then be removed and the stationary contact may be removed by unscrewing from the front of the base.

To replace the main contacts, first remove screws (G) and the calibrating unit assembly. The movable contacts may then be taken off by removing screw (F). To remove the stationary contacts first take off nut (M) and remove the complete movable contact assembly. The stationary contacts may then be unscrewed from their studs. On relays having a metal gear on the motor shaft, before tightening screw (M), the contact arm resetting spring must be wound up by inserting a screwdriver in the slotted end of shaft (N) and giving it three turns counter-clockwise. With the spring held in this position, tighten nut (M). In replacing the calibrating unit assembly on the relays having a rubber driving disk on the motor shaft, see that the pivoting bushings are replaced with screws (G) and that washers (R) are inserted between the two brackets of the calibrating unit assembly.

To replace the gear shaft return spring, remove the calibrating unit assembly as described in the preceding paragraph. Then remove nut (K), take off the calibrating disk, and pull out the gear shaft. Insert one end of the new spring through the hole provided in the calibrating-unit bracket on the gear side. Insert the gear shaft through the spring and slip the loose end of the spring through the hole in the trip arm. Push the gear shaft through the bearing and trip arm and assemble the calibrating disk and nut (K). Bend over at right angles the end of the spring projecting through the calibrating unit bracket. Pull out the other end of spring 1½ inches, bend at right angle, and cut off excess wire. Care must be taken in assembling the calibrating disk back on the shaft to have the forked portion over the projection on the bracket.

In replacing the latch spring, insert one end of the spring through the hole in the latch arm, tighten the spring by giving it ½-turn clockwise, and reset the other end in the slot provided in

the end of the shaft. Pinch the slotted end of the shaft together to clamp the end of the spring in place.

For relays having the rubber disk on the motor shaft, the rubber disk should be replaced if it has worn so the gap between brackets (X) and (Y) at point (W) is reduced to $\frac{1}{32}$ in.

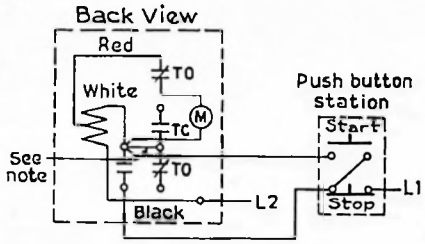


Fig. 3. Connections with Momentary-contact Push-button Station

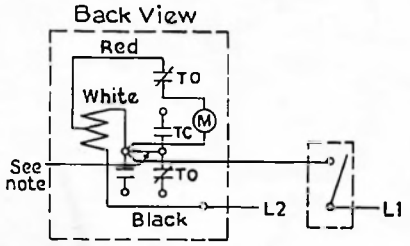


Fig. 4. Connections with Maintaining-contact Master Switch

NOTE: If the relay studs in Fig. 3 and 4 are connected by a punching, as indicated, the punching should be removed unless the wiring diagram shows these studs connected together.

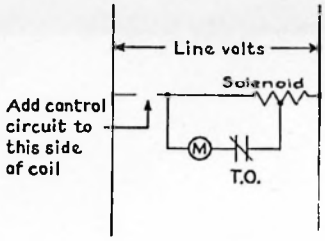


Fig. 5. Elementary Connections

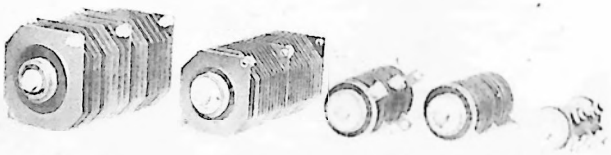
Renewal Parts

Renewal parts should be ordered from the nearest Sales Office of the General Electric Company, Cat. No. as listed below:

	Cat. No.
Movable contact for interlock	3805658G8
Stationary contacts for interlock, for normally open and for normally closed contacts	3805657G1
Movable contact, normally open or normally closed	4901681G1
Torsion spring for latch arm	2413952
Compression spring for motor cut out switch contact	2412941
Spring for interlock contact	2411917
Gear shaft return spring	2413999
Torsion resetting spring for contact arm (omit for relays having rubber disk drive)	2414157
Spring (S, Fig. 2). Used only for relays having rubber disk drive	235182
Rubber disk, $\frac{25}{32}$ in. diam for 2-20 and 4-40 second relays (if used)	5181591
Rubber disk, $\frac{33}{64}$ in. diam for other relays (if used)	5352523

INSTRUCTIONS

COPPER OXIDE RECTIFIER UNITS



GENERAL ELECTRIC

APPLIANCE AND MERCHANDISE DEPARTMENT
BRIDGEPORT, CONN.

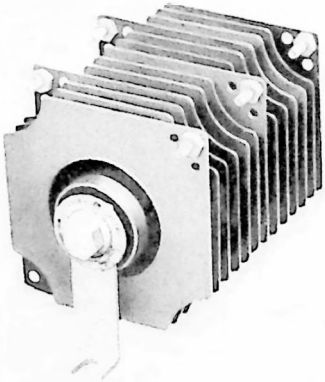


Fig. 1

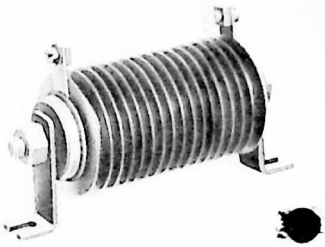


Fig. 2

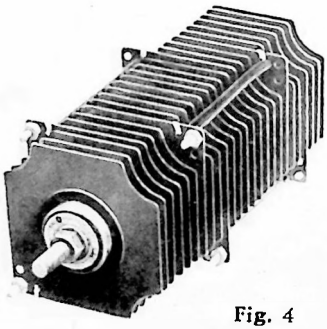


Fig. 4

TYPES OF COPPER OXIDE RECTIFIER UNITS

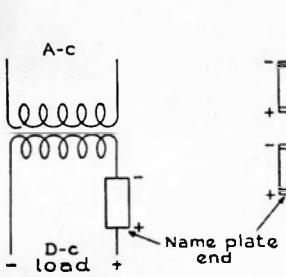


Fig. 5

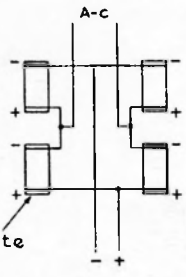


Fig. 6

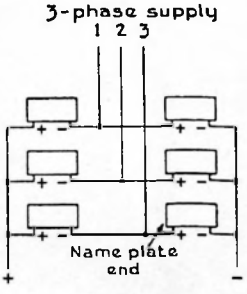


Fig. 7

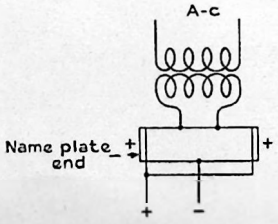


Fig. 8

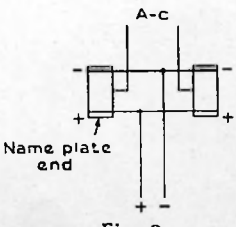


Fig. 9

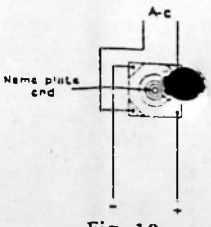


Fig. 10

WIRING DIAGRAMS

COPPER OXIDE RECTIFIER UNITS

The copper-oxide rectifier unit consists essentially of a number of copper-oxide elements assembled on a bolt and held under a predetermined pressure. The units are supplied either with or without ventilating fins (see Fig. 1 and 3) depending upon the current output required. Three general types of units are illustrated to show some of the various methods of assembly.

POLARITY

As a means of determining polarity on most units, a copper-plated end-washer is located at the positive terminal and a cadmium-plated washer at the negative terminal. The polarity of the terminals of the most commonly used types of rectifier units is shown in the illustrations on page 4. The nameplate is placed at the positive end of the unit; a green spot shows the a-c terminals and a red and black spot the + and − ones.

CONNECTIONS

Fig. 5 shows an elementary connection of a copper-oxide unit of the type shown in Fig. 2, to obtain half-wave rectification. By combining a unit of this type with a number of other similar units, it is possible to obtain full-wave rectification. Such circuits are shown in Fig. 6 for a single-phase line and Fig. 7 for a 3-phase line. A rectifier unit of the type shown in Fig. 1 is a full-wave unit and is connected as shown in Fig. 8.

Rectifier units of the type shown in Fig. 3 are identical with those in Fig. 2 except that a center tap is provided to allow operating the units on circuits as shown in Fig. 9.

Rectifier units of the type shown in Fig. 4 are full-wave units with several washers in multiple and should be wired as shown in Fig. 10.

By combining units in series, it is possible to increase the voltage range of rectifiers of the type shown in Fig. 2 and 3. All similar types can be run in multiple to obtain larger current outputs.

When connecting units in series or multiple, it is necessary to use units of approximately the same age or length of service, in order to be sure of proper distribution of load.

Special connection diagrams applying to special units will be furnished on request.

INSTALLATION

To insure maximum life and freedom from trouble, copper-oxide rectifier units should be installed correctly. The units should always be mounted with the bolt or stud axis in the horizontal position. The units should always be installed at the coolest point of the assembly and never over or close to heat-dissipating equipment such as resistances, lamps, transformers, vacuum tubes, etc. All enclosures should permit free ventilation. Ambient temperatures which are continuously above 100F should be avoided unless units which are correctly derated to take care of such temperatures are used.

It is important not to loosen or tighten the pressure on the units, as this may affect the operation of the device. Rectifier circuits should be protected by fusing the incoming power line.

If the rectifiers are installed in a dusty location, it is recommended that they be cleaned occasionally.

If installed in locations where corrosive atmospheres are present, the rectifiers should be protected with a heavy coat of corrosion-proof varnish. Such units, which are treated at the factory, can be furnished.

RATINGS

All published ratings are given on the basis of continuous loading of the units. The ratings apply only where the rectifier is mounted in atmosphere of normal humidity and with ambient temperatures not exceeding 100F and freely ventilated. If the units run across the a-c line with the d-c output terminals on open circuit, it is necessary to lower the voltage rating of the unit 15 per cent or use 85 per cent of the published voltage rating.

Ratings of copper-oxide units are based on their capacity to dissipate heat. Because it takes a certain length of time to heat the units, it is possible to overload them for short periods of time. The amount of overload depends on the aged condition of the units. The units should not be overloaded for any continuous length of time since they may be damaged if overheated.

The rectifiers under normal operation should run cool. When first placed in operation, these units will deliver a higher output than required. This is necessary to compensate for the increase in resistance of the copper-oxide unit while in operation. After 2500 hours the output will correspond to, and remain approximately at, the specified rating. It is important that devices with which the rectifier is used have sufficient range of operation to take care of this change in output due to aging, or that a method be provided for reducing the applied a-c voltage when the rectifier is new.

TESTING UNITS

All units are insulated to ground and flash-tested at 1800 volts rms at the factory. If units are suspected to have failed, the condition of the rectifier can be usually determined by testing the ratio of the current that flows between the d-c terminals, first in one direction and then in the other. This test should be performed at room temperature. The d-c voltage to be used will vary with the number of elements in the unit. A recommended value is 1¼ volts, d-c per element. The values of leakage current and forward current depend entirely on the age of the unit and method of operation. No definite values can be given but all units used in the same assembly should have approximately the same values. To test the units, disconnect them from the circuit, and test between terminals.

If further information is desired, apply to your dealer or to the General Electric Company, Appliance and Merchandise Department, 1285 Boston Avenue, Bridgeport, Connecticut. Always mention the Model Number of the units.

POSITION AND MARKINGS OF TERMINALS ON MOST COMMON TYPES OF RECTIFIERS

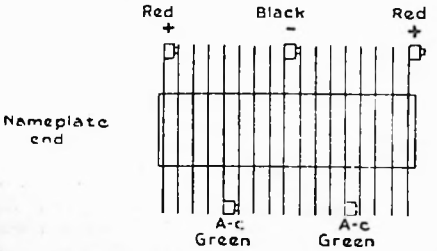


Fig. 11. Full-wave, Single-stack Rectifier as Used in Fig. 8

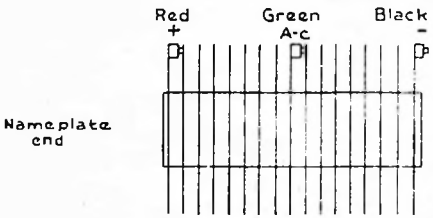


Fig. 12. One Three-terminal Stack as Used in Fig. 9

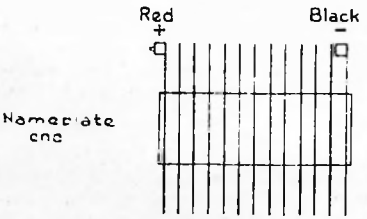


Fig. 13. One Two-terminal Stack as Used in Fig. 5, 6, and 7

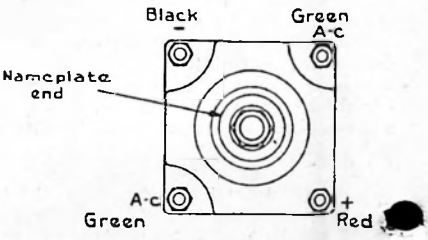


Fig. 14. Full-wave, Single-stack Rectifier with Several Washers in Multiple as Used in Fig. 10

For special rectifiers refer to the Dealer or to the Appliance and Merchandise Department, General Electric Company, 1285 Boston Ave., Bridgeport, Conn.